TRIC RAILWAY JOURNAL
December 11, 1915

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TRIC RAILWAY JOURNAL

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Electric Railway Journal

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JUDGE McCALL'S REMOVAL

Few people, we believe, will find fault with Governor Whitman for his action this week in removing Chairman McCall of the Public Service Commission of New York, First District. The charges which form the basis for the removal are quite different in character than those which were presented against the late chairman and certain other members of the commission last spring. It is difficult to understand how a man of Judge McCall's undoubted ability and experience could have neglected to comply with a perfectly proper provision of the public service law, which was certainly violated in the spirit if not in the letter. The Governor was justified in this removal, but it remains to be seen whether he will exercise equally good judgment in the appointment of a successor and with the other appointments for public service commissioners which will come up during his term. Any further appointments should be made purely on the basis of fitness for office. Such a qualification includes knowledge of the needs of the public utility companies and of the public in the way of public utility service, a judicial ability to decide conflicting claims dispassionately and correctly, a standing in the community which will give these decisions weight, and a temperament which will withstand adverse criticism when the possessor knows he is right. The last appointment made by the Governor to the commission in the first district was said to be based upon "personal" reasons. We hope that the appointment of a successor to Judge McCall will be based on the fitness to office only of the appointee. The responsible nature of the duties demands this.

REWARDING REAL DIRECTORS

Much attention has been paid to the new $50,000,000 American International Corporation, formed to open up safely and intelligently a way for American investments in foreign markets and to finance and operate new projects in developing the resources of foreign countries with which trade is desired. A notable work, truly, but the very magnitude of the proposition has caused many to overlook one interesting feature of the corporation that is in reality the best earnest of successful operation. We mean the allowance to the directors of $1,000,000 of managers' "preferred" stock, which although only one-fiftieth of the total stock will participate to the extent of one-fifth in all excess profits after the dividends on this stock and the common stock up to 7 per cent have been paid. This method of giving directors a share in the profits is new in this country, but very common abroad, where it has been found of great advantage in securing the service of capable men and their steadfast attention to increasing the profits of the corporation. Its efficacy, of course, largely depends on whether the holding of the managers' stock is rigidly restricted to those actively engaged in the work of management. It must be remembered that the plan constitutes simply a monetary inspiration, and if excessively large boards of directors and the membership of names only are still desired, American corporations in general will not secure many benefits by emulating the American International Corporation. In other words, the plan constitutes a reward for efficient management, but this reward is susceptible of sure and unerring application only when all inefficient and useless deadwood in the directorate is thoroughly eradicated.

"PLAIN TALKS TO OUR STREET CAR PATRONS"

What is publicity from the electric railway standpoint? This is a question that the ELECTRIC RAILWAY JOURNAL has endeavored to answer a good many times. But just what electric railway publicity is—what it consists of; what it looks like, and how it is handled—remains obscure in a great many minds. For this reason we commend to the attention of the industry a pamphlet under the above title issued by The Milwaukee Electric Railway & Light Company, containing reprints of sixteen articles printed in the local newspapers. Twenty-two of these have been printed and others will follow. The articles show how losing rates and excessive taxes prevent the giving of the best service; explain the size and usefulness of the system; show how the city of Milwaukee broke its agreement with the company and prevented the earning of a fair return under the conditions fixed by the original bargain with the city; how the earnings per passenger have declined; how money that should be spent on electric railway service is diverted to other purposes; explain how the company is taxed by the State on more than $5,600,000 of actual values, the existence of which for earning purposes the State refuses to recognize; indicate how politicians trying to win favor by baiting street railways, whittle down wages and cripple the service; prove that rising costs and falling revenues justify prompt action for the relief of the company; and in conclusion they meet squarely the question, Why higher fares? We know of no better concrete example of what electric railway publicity means than is embodied in these articles. Their effect upon the public has been very satisfactory. Although it was for the information of its patrons rather than for the industry as a whole that these articles were prepared, we feel quite safe in saying that copies of them will be gladly sent to any railway man who asks for them.

FUNDAMENTAL RATE ISSUE PASSED UPON

The recent decision of the Missouri Public Service Commission in increasing railroad passenger rates from 2 cents to 2½ cents, even with certain restrictions on mileage book rates and the like, will undoubtedly be considered a surprising development in railroad rate-making. This is not so much on account of the size of the increase as on account of the fact that in making its decision the commisison in the face of a State-wide notorious unfriendliness to common carriers has dared to express itself quite candidly on a fundamental issue heretofore usually dodged. In its two big rate cases the Interstate Commerce Commission each time evaded the issue of a general advance in railroad rates, with the objection that such an advance might mean the accumulation of excessive profits by some lines. Now, however, the Missouri commission has placed on record a definite attack on this point of view that must sooner or later be fully and openly met in the tribunals of highest resort.

On the unassailable premise that railroads need advanced rates in order to be able to meet their obligations and maintain dividends in such a manner as to encourage further investments, the commission has granted a general increase. The reasons advanced in support of this act form the noteworthy part of the decision. Considering that it had been asked to fix one schedule of rates that would be reasonable for fourteen railroads serving dissimilar and not equally advantageous territories, the commission proclaimed that, however well-informed it might be as to the values upon which the companies were entitled to earn a fair return, it could not adjust the intra-state rates so as to produce an equality of earnings through district or line discriminations. Moreover, it justified this refusal to tinker with the rates of individual companies by emphatically declaring that differences in conditions respecting operating efficiency, economies of capitalization, and favorable routes and locations, are all elements that might with justice be reflected in differences among the various companies with regard to the profits secured from operation.

This basing of rates so that each company honestly constructed and operated can acquire a reasonable return, without a confiscation of profits in the case of the companies that under more favorable conditions and economy of operation have proved profitable, is quite at variance with the usual desire of the demagogue to cut down the profits of every prosperous company by passing maximum rate laws without regard to how these laws may affect the return of companies not so favorably situated. Thanks to recent rate decisions, such state laws can no longer be operative when they run into conflict with interstate rates, but the fundamental question involved in the Missouri decision still remains fairly up to the federal and other state commissions. If the Missouri commission finds it inequitable and even impossible to equalize profits by basing rates on values established, what will the Interstate Commerce Commission do with its enormously costly federal valuation figures? Does anyone contemplate that these valuation figures and a reasonable return thereon will be used in fixing different rate standards for separate companies so as to equalize the profits? If so, it would be well to look ahead and see whether the fundamental idea of the Missouri commission can be rebutted or whether it must be accepted as leading to the most equitable solution of the rate problem. If the Missouri decision can move the national authorities to meet fairly and squarely this fundamental issue raised, it will fulfill an inestimably greater need than the mere increasing of the Missouri rates, deserved as this was.

CLOSING THE TRACK RENEWAL LOOPHOLE

No street railway manager will disagree with the statement that one of the most urgent needs of the industry is a better public understanding of electric railway problems. In line with that thought, would not public attention directed to the unnecessary waste of materials and labor in making premature pavement and rail renewals aid in stopping one of the leaks in street railway operation? In other words, is not the decided stand taken by the Puget Sound Traction, Light & Power Company, Seattle, Wash., for relief from wasteful franchise obligations, mentioned on page 1005 of our Nov. 13 issue, suggestive of similar action by other companies? Perhaps in the first instance it would be unnecessary to resort to the public service commission, and certainly not in communities where the relations of the public and the railway company are otherwise satisfactory. Where companies are obliged to comply with wasteful ordinance requirements this field offers a fruitful opportunity for curbing unnecessary expenditures. Reference to the communications from engineers discussing rail renewals, published in recent issues, shows that municipal requirements rather than the exigencies of the case frequently preclude consideration of renewal problems from an economy standpoint. This condition is especially true of the pavement. Doubtless there are many instances where the waste is so inconsiderable as not to warrant serious objection on the part of the railway company. On the other hand, there are cases where the railway company could profitably afford to bring to the attention of the public the money lost in premature rail renewals.

Loopholes such as these have done much to reduce the railway company's net earnings, and an increase in rates to offset this loss in most communities is strictly out of the question. A diplomatic campaign of education continuously conducted whenever the railway is confronted with premature renewals should produce results. Sometimes these renewals may be treated as betterments and charged to capital account, but properly most of them should be paid out of operation. If the rate of increase in the depreciation fund has been such as to make the time elapsed insufficient to accumulate money to pay for an unnecessary renewal, where else can funds be obtained? No legitimate source, other than taking it out of the earnings, is afforded. Manifestly, if money spent in this manner could be saved it could be used on parts of the property where it was

rightfully required. Summing up, we are of the opinion that an educational campaign to close these apparent loopholes will do much good and will materially aid in giving adequate protection to the integrity of electric railway securities.

CHICAGO ELECTRIFICATION AS AN ECONOMIC MEASURE

The complete report of the Chicago committee on smoke abatement and railway terminal electrification has come to hand this week, and an abstract of a number of the points not covered in the initial statement published last week is given elsewhere in this issue. The report is a volume of more than 1200 pages. Briefly, the portion on smoke abatement shows that the steam railroads are responsible for but 12 per cent of the total fuel burned in the city so that if all of these railroads should be electrified the reduction in the total smoke pollution of the atmosphere would be comparatively negligible. The second part of the book may be epitomized into three statements: (1) that the work will be much more difficult and costly than anything of its kind that has heretofore been undertaken; (2) when completed, the interest on the investment would bring about a heavy deficit annually, and (3), that the constitution of Illinois forbids participation by Chicago in any part of the heavy expense of this work.

Of course, the discovery that the railroads' smoke is almost a negligible fraction of that produced by other sources is by no means an argument against the importance of the subject under all circumstances. Steam locomotive smoke in particular locations is still going to constitute a reason for the substitution of electric power, and although the benefits accruing from the change may be indeterminate they will none the less be valuable. Locomotive smoke is in many instances a nuisance of more concentrated nature than that caused by domestic fires or factories. To the city at large it may be of minor importance, but it is not to be denied that in the immediate vicinity of a terminal in a large city, property values may be affected to an enormous extent.

An illustration will be found in the district in New York City that is reaping benefits from the electrification of the New York Central and New Haven railroads. Here an area two blocks in width extending from Forty-second Street to Fifty-sixth Street, which was at one time a veritable pest hole, has now become one of the most attractive portions of the city for business and amusement purposes, and, still farther north from the terminal, Park Avenue has become the most popular location in New York for high-priced apartment structures.

Undoubtedly the problem is one of great magnitude and difficulty, but the world would have stood still from the day of Adam if progress had not been made in overcoming obstacles of this kind. Is not this a time for the citizens of Chicago, acting through the municipality on the initiative of the Association of Commerce which instituted this original investigation, to see what they can do to help in this work? They are to be the chief beneficiaries in the increase in real estate values, in the advertisement which would come to the city from the completion of a work and from satisfactory terminal facilities. At present it is said that the constitution forbids the participation of Chicago itself in any way, but such things have been known as the bringing about of changes in constitutions. If the work of electrification cannot be undertaken at once the city of Chicago would do well to put itself in a position so that it can financially assist some of the more important companies to electrify if they cannot figure out a net direct saving from a railroad standpoint when all of the factors are taken into consideration.

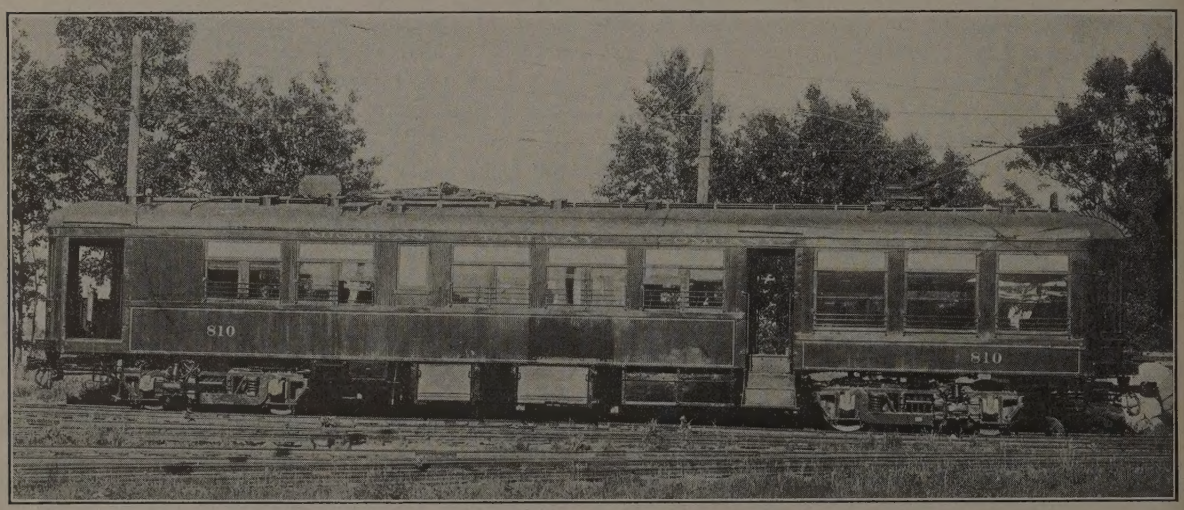
It is not too much indeed to expect that the results obtained by electrification in New York would be repeated, at least in part, on many of the existing steam railroad terminals in Chicago. A glance at the map of the city shows a number of terminals right in the heart of Chicago, where there is a great deal of property which would be most desirable if it did not abut on railroad entrance tracks and switch and freight yards. We wish that the committee in its exhaustive study of the smoke abatement problem and detailed analysis of the cost of electrical conversion had also given at least an estimate of the returns to the owners of this property and to the city at large for railway terminal electrification. It is true that the railroads themselves would derive directly only a small portion of the benefits thus obtained from the abolition of smoke and the greater track capacity, but the citizens of Chicago would undoubtedly derive in annual returns many times the annual deficit, even although it should be as high as the estimate of $15,000,000.

From the railroad standpoint there are distinct economies which accompany the use of electric power, but the railroads should not be asked to make the change where these direct returns are insufficient to pay at least the interest and depreciation upon the investment. If this is not the case, there is no incentive to the railroad to make the change. The Chicago report gives no indication that there may not be economic advantages with some individual roads, but simply that on the basis of the estimates of costs made it is not profitable for the roads as a whole. The question as it stands at the present day is larger than one of the exact and detailed costs of the proposed installation. Whether the committee has possibly been too conservative in its figures of cost for the entire installation is largely a matter of detail. We hope that a careful analysis of the situation as it applies to individual roads will show that even on the basis of net profit in dollars and cents certain roads will find the change warranted. The electrification of a few roads will constitute the best proof possible of the indeterminate benefits of electric operation, and it may induce the city to meet part of the expense for those railroads which cannot afford to electrify. If a precedent is needed it will be found in those States where the community now defrays part of the expense necessitated by the elimination of grades.

Steel Cars for Michigan Railway

Special Types Have Been Designed for Limited, Local and Express and Freight Service—The Electrical Equipment Includes 600-2400-Volt Motor Groups with Auxiliary Control and Lighting System Operated by Storage Battery

The all-steel passenger and express cars recently placed in service by the Michigan Railway Company on its new 2400-volt, third-rail line, which was described in the ELECTRIC RAILWAY JOURNAL for June 19, 1915, are remarkable in many respects. They are equal in appointment and provisions for the passengers' comfort to the finest steam railroad coaches, and they are the first cars to carry 600-2400-volt electrical equipment operated from a third-rail, possessing also the specially notable feature of storage-battery operation for the lighting system, control and all auxiliary equipment. Three types of cars have been provided for the different services—limited, local, and express, or freight—and the features of each type are outlined in the following paragraphs.



MICHIGAN RAILWAY'S CARS—VIEW OF LIMITED CAR SHOWING BEADED STEEL CAR SIDING

LIMITED CAR ARRANGEMENT

The motor cars for limited passenger-train service are, without doubt, the finest in interurban service in this country. They are of the side-entrance type, a feature adopted to provide exclusiveness for the parlor-observation compartment which occupies the rear end. The principal dimensions are as follows:

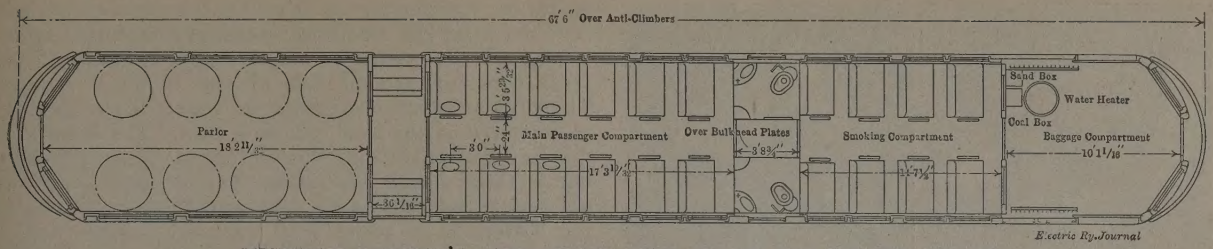
Length over all	67 ft. 8 in.
Length over vestibules	6 ft. 10 in.
Length parlor compartment	18 ft. 2 in.
Length passenger compartment	17 ft. 3 in.
Length smoking compartment	11 ft. 7½ in.
Length baggage compartment	10 ft. 1 in.
Width corridor at side entrance	3 ft.
Width over sheathing	9 ft. 6 in.
Height rail to top of floor	4 ft. 4 in.
Height rail to top of roof	13 ft. 7 in.
Truck centers	42 ft. 2 in.
Wheelbase	8 ft.
Wheels	37 in. diameter
Journals	6 in. x 11 in.

STRUCTURAL DETAILS

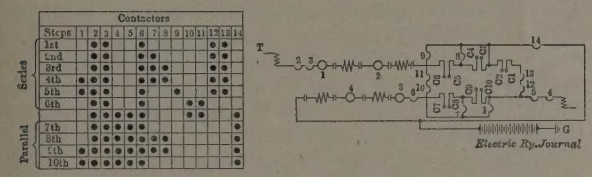
Undoubtedly the most unusual structural feature in these cars is the fish-belly girder type of underframe, which was necessitated to simplify the framing for the side entrances and for the large windows in the parlor section. Relatively light cross-bearers and side sills transfer all the load to the center sills, which also absorb buffing and pulling strains when the cars are operated in trains. The space between the sills is utilized to carry the conduits and some of the brake rods. The maximum depth of the center sills is 26½ in., tapering off to a depth of 8 13/16 in. inside the bolsters and to 7 13/16 in. at points just inside the corner posts. They are made up of 5/16-in. open-hearth steel plates with 3½-in. x 5/16-in. x 3-in. angle flanges, and they are spaced 20 in. face to face of web plates, the top cover plate being 30 in. wide by 3/16 in. thick. The intermediate sills are formed of 3-in., 6.7-lb. Z-bars, and the side sills of 8-in., 11¼-lb. channels. The Z-bars are supported on 4-in., 6¼-lb. channel cross-bearers. Riveted to the tops of the side, intermediate and center sills is a No. 14 open-hearth steel plate, upon which is placed two courses of ½-in. Salamander hairfelt for insulating purposes. Over this, and fastened to ⅞-in. x 1-in. nailing strips, is Keystone flooring, which in turn is covered with Flexolith.

Pressed-steel U-sections of ⅛-in. metal form the panel and single window posts. These are framed into the side sills and the 5-in. channel side plates. The posts were arranged for six double windows, two large parlor compartment windows, the side entrances and one baggage door. The side sheathing below the windows is 3/32-in. sheet metal, over which is riveted Pullman beaded-steel car siding, and just inside the sheathing is a ¾-in. layer of Flaxlinum insulation. The inside finish is of ⅛-in. open-hearth steel backed by 3/16-in. Agasote insulation. The belt rail along the bottom of the windows is formed of a 3-in. x 2½-in. x ⅜-in. angle on the outside, riveted to a 2-in. x 2-in. x 3/16-in. angle on the inside. In the transverse section of the car body it will be noted that all rivets in the inside and outside finish are covered with pressings, which in some instances were spot-welded in place.

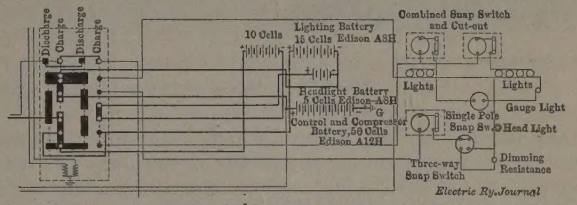
The roof is of the plain-arch type and is formed of 1¾-in. x 1¾-in. x 3/16-in. angles joined at the center



MICHIGAN RAILWAY'S CARS—FLOOR PLAN OF CAR FOR LIMITED SERVICE



MICHIGAN RAILWAY'S CARS—MOTOR CIRCUIT CONNECTIONS

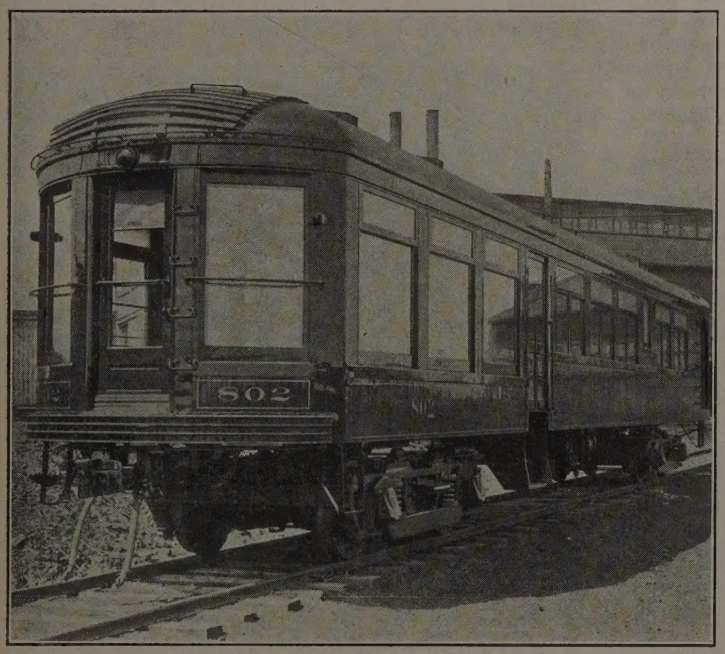


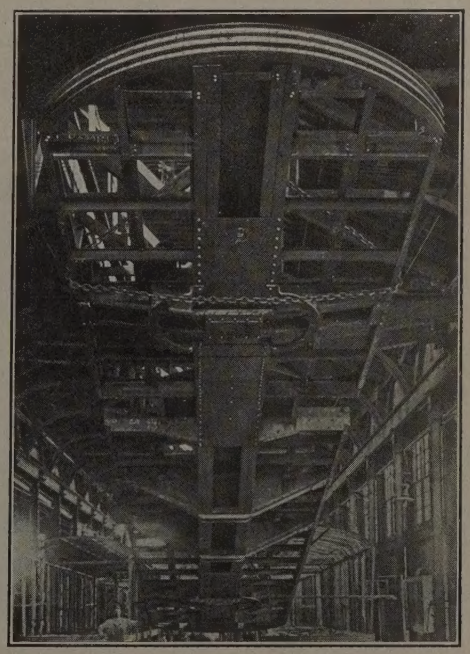
MICHIGAN RAILWAY'S CARS—LIGHTING CIRCUITS

and quarter points with 3¼-in. x 3/16-in. x 12 and 8-in. gusset plates respectively. Fireproof Agasote ¼ in. thick and covered with No. 6 duck forms the roof covering, and 3/16-in. Agasote was adopted for the headlining. In order to give additional rigidity to the roof, longitudinal rafters consisting of 1¼-in. x 1¼-in. x ⅛-in. angles were installed just above the side plates, and 1½-in. x 1½-in. x 3/16-in. angles 16 in. each side of the car-body center line. These are continuous between bonnets and reinforced by additional longitudinal members over the side entrances and at the supporting points of the trolley and pantograph. Steel finish, except for the window frames and stools, obtains throughout the entire car body.

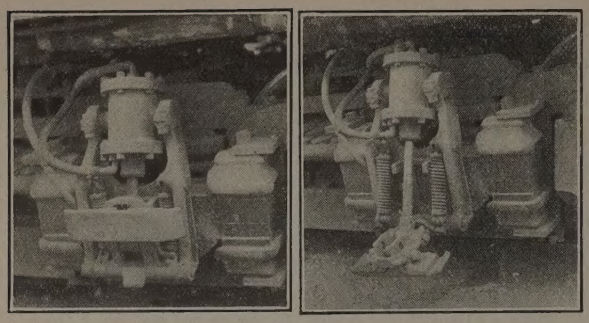
The doors in the partitions are all hinged and equipped with door checks. Each end of the car is provided with a center-end door, and to facilitate handling the trolley, the rear door has a brass hand rail. O. M. Edwards balanced trapdoors with foot latches are provided at the two side entrances and are covered with interlocking rubber tile. The steps are formed of steel pressings with the treads covered with Pullman standard peerless rubber treads. Other specialties included in the car's equipment are O. M. Edwards sash locks and storm strips, Tuco friction curtain rollers with Pantasote curtain material, Ohio Brass sand traps and valve, Tomlinson automatic M.C.B. radial drawbars, Ackley drum-type hand brakes, General Electric nitrogen filled mazda headlights, Pyrene fire extinguishers, Baltimore ball-bearing center-bearing plates and Everwear mats.

Sixteen Peerless exhaust-type ventilators are installed in the roof with brass registers on the inside of the car. These combined with a Sorocco blower provide a satisfactory ventilating system for the several compartments. An especially-designed hot-water heating system was furnished by the Peter Smith Heater Company, equipped with a double-circulating system through a central tank. This supplies eight 1½-in. coils supported on racks just above the floor line on each side of the car and assures efficient heating at the low temperatures prevailing during the Michigan winters. With the exception of a change of the type of ventilators, this heating and ventilating system is the same as





MICHIGAN RAILWAY'S CARS—OBSERVATION END OF CAR FOR LIMITED SERVICE—STEEL UNDERFRAME



MICHIGAN RAILWAY'S CARS—THIRD-RAIL SHOE RAISED AND IN OPERATING POSITION

that used in the Michigan United Traction Company's steel cars described on page 108, of the July 18, 1914, issue of the ELECTRIC RAILWAY JOURNAL. An inside width of 9 ft. permits the use of stationary seats 3 ft. 5 29/32 in. in length, practically equal to the standard seat width for steam railroads. The parlor compartment is furnished with four revolving chairs and seven upholstered armchairs.

AUXILIARIES OPERATED BY STORAGE BATTERY

Aside from the design and the exterior and interior finish of this limited car, the most notable feature is the storage-battery operated auxiliaries and lighting system. The method of charging the storage batteries is different from that used in the lighting system on the steel cars of the Michigan United Traction System, described on page 106 in the July 18, 1914, issue of this paper. The storage battery on this car consists of two groups, one with fifty cells of Edison A-12-H and the other with thirty cells of Edison A-8-H divided into three groups, five cells for the headlight and twenty-five cells for the car-lighting system. The group of fifty cells supplies energy to operate the control, compressor, third-rail shoe, pantograph and trolley, and other auxiliaries. The battery is located under the car where it is arranged for ease of inspection.

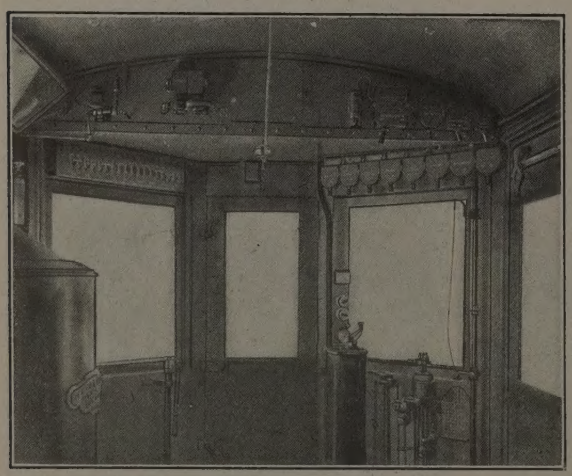
The control is of the Sprague-GE non-automatic type, giving six steps in series and four in series-parallel. Fourteen contactors, designed to interrupt the 2400-volt current at their main contacts, are employed. Control cables are installed on all cars to provide for operation in trains as traffic requires. Switches are located in the operator's cab for changing from 600-volt to 2400-volt operation, for raising and lowering the pantograph, and for operating the third-rail shoes of the entire train.

The storage batteries are charged by taking current from the ground side of the 1200-volt motors. The auxiliaries are operated at 60 volts, the car lighting at 30 volts and the headlight at 6 volts. The feature of this installation is that the battery is charged from a high-voltage circuit and takes current continuously in accordance with the operating requirements. The lighting battery is in series with the main battery and is on charge during the day and cut off during the lighting period, at which time it is discharged direct to the lighting circuits without a regulating device. The lighting system control is of the multiple-unit type operated from a switch in the cab. All batteries in the train lighting system are changed over simultaneously from charge to discharge, or the reverse. Battery circuits are arranged to meet any emergency, it being possible to supply the lighting-system energy from the main battery should the batteries in the lighting system have been completely discharged or disabled. Such a contingency, however, has never occurred, although the cars have now been in operation more than one year.

Operation of auxiliaries by the storage battery was considered advisable in order to confine the 2400-volt d.c. energy to the motors and controller. All auxiliaries, including the operating switches, the third-rail shoes, the pantograph and the trolley pole are controlled by the multiple-unit system. Provision is also made for charging the batteries when the cars are operating over either 2400-volt or 600-volt lines.

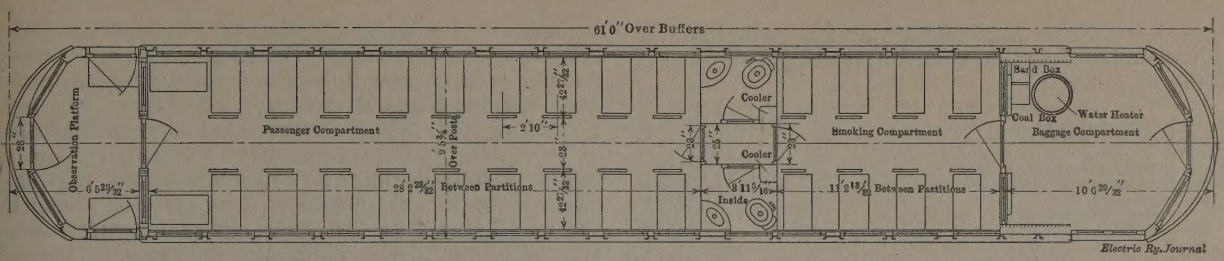
CURRENT COLLECTION AND OTHER DETAILS

Energy is supplied to the electrical equipment on these cars from both a third-rail and an overhead trolley. The third-rail conductor is charged at 2400 volts, and when the entrance to a city street is approached the energy supply is obtained from an overhead trolley also charged at 2400 volts. In the city streets, however, a 600-volt trolley is installed. On the 2400-volt trolley the pantograph serves as the current collector, while on the 600-volt trolley an ordinary pole is used. The two types were necessary to provide for high-speed operation where overhead trolley was provided in the villages along the route or in car-storage yards. The pantograph and the trolley pole are pneumatically controlled and are



MICHIGAN RAILWAY'S CARS—CONTROLLER AND OVERHEAD SWITCHES IN MOTORMAN'S CAB

MICHIGAN RAILWAY'S CARS—INTERIOR VIEW OF LOCAL CAR, SHOWING STEEL FINISH



MICHIGAN RAILWAY'S CARS—FLOOR PLAN OF CAR FOR LOCAL SERVICE

so interlocked that it is impossible for both to be raised at the same time. This avoids any possibility of short-circuiting the 2400-volt direct current through the car to the 600-volt line at the section insulators. The pantograph is fitted with copper wearing strips and operates at 15-lb. pressure. The trolley pole is equipped with a Wasson pneumatic base, which permits it to be interlocked with the pantograph-raising mechanism.

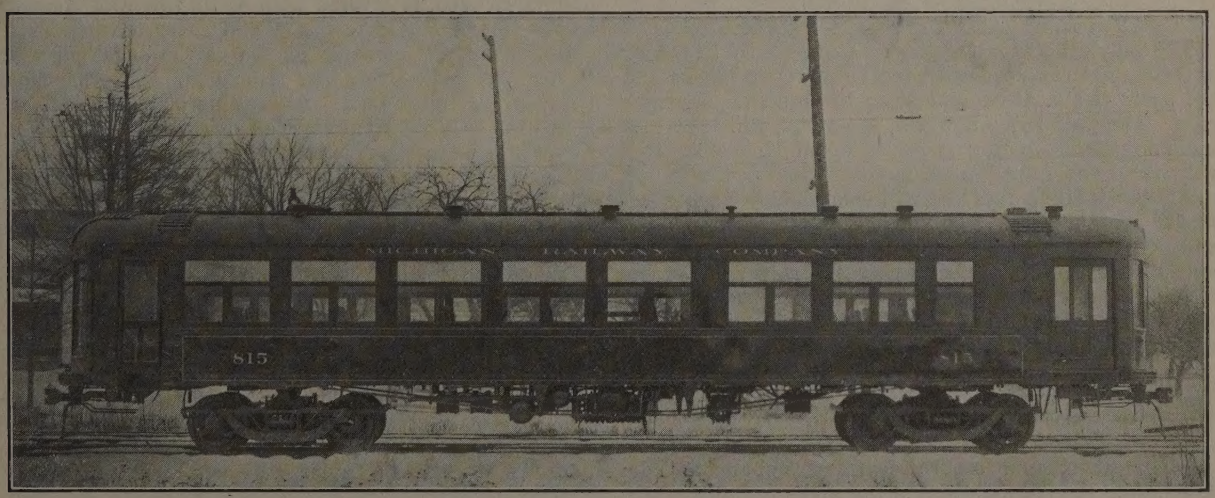
The third-rail shoe is also raised and lowered pneumatically. Owing to the fact that a 32-in. clearance is allowed between the third-rail and the near track rail on private right-of-way, the third-rail shoe projects outside the car-body clearance line too far for safe operation in city streets. Accordingly, the folding shoe which is shown in one of the accompanying illustrations was adopted, this having a machine-steel contact shoe that is bolted to the shoe mechanism. In ordinary operation two compression springs hold the shoe on the over-running third-rail. These springs also hold the shoe in the raised position, so that air is required only to raise and lower the shoe. Should it be necessary to cut sleet during the winter months, the machine-steel contact shoes are removed and a special shoe with steel inserts substituted. When this is done the air cylinder is employed to obtain greater pressure than afforded by compression springs, and pressure up to 750 lb. is available.

In connection with the over-running, 2400-volt, third-rail installation an interesting phenomenon occurred during the past winter. Only one sleet storm was experienced, at which time about ¾ in. of ice formed on the top of the rail. Delay in substituting the sleet-cutting shoes for the ordinary shoes developed the fact that although this much sleet was on the top of the rail no difficulty was experienced in collecting sufficient energy to operate the car at full speed. This was believed to be due to creepage of the 2400-volt current from the side of the rail to the shoe over the ice coat on the rail-head. Whether this condition will always obtain is not known, but it did occur during the only sleet storm in the winter of 1914-1915.

Special Baldwin Locomotive Works trucks were necessary for these cars, and they are probably the heaviest trucks ever used in electric interurban service. Each weighs 17,800 lb. and is constructed for a 50,000-lb. center-plate load, a special design being required to provide sufficient clearance for the 600-2400-volt motors. The motors are General Electric No. 239, having 150 hp. capacity, four of them being installed on each limited car. The motors are rated at 1200 volts and are connected two in series. When running over the 600-volt city lines they operate at half speed. The motors are longitudinally ventilated, of a type especially developed for heavy, multiple-unit cars. "Tool steel" gears and pinions with a gear ratio of 33:39 are installed, this giving a free-running speed of 75 m.p.h. The actual schedule between the city limits of Grand Rapids and Kalamazoo calls for a 49-mile run with one stop to be made in fifty minutes. The total weight of all electrical apparatus was 37,000 lb., exclusive of the storage battery, which weighs 4000 lb. The car body proper weighs 66,000 lb., and this weight, together with the trucks and electrical equipment, makes the total weight of the car 142,600 lb.

The air brakes are of the combined straight and automatic type, air being furnished by a C.P. 28 compressor with motor wound for 60 volts. This compressor is capable of delivering 25 cu. ft. of free air against 90 lb. per square inch tank pressure. This capacity of compressor is ample as no air is required for whistles, electro-pneumatic horns being provided for giving warning signals. Each limited car has an 18-in. brake cylinder, two 16-in. x 60-in. main reservoirs, a 20½-in. x 36-in. supplementary reservoir, and a 16-in. x 33-in. auxiliary reservoir.

Essentially, the local all-steel car is a replica of the Michigan United Traction Company's steel passenger



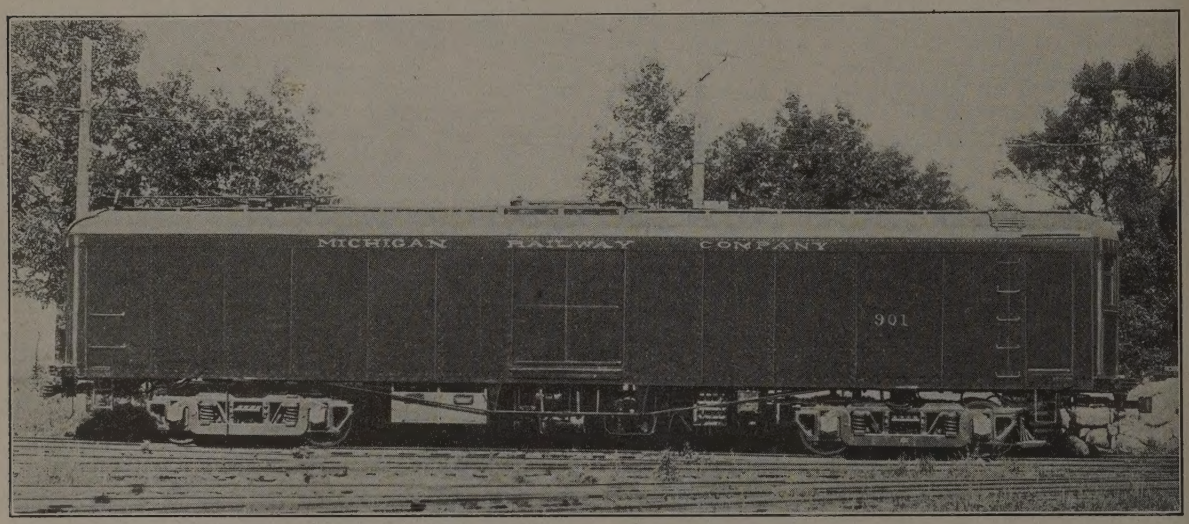
MICHIGAN RAILWAY'S CARS—CAR FOR LOCAL SERVICE

cars described on page 106 of the ELECTRIC RAILWAY JOURNAL for July 18, 1914, the principal dimensions being as follows:

Length over bumpers	61 ft.
Length over vestibules	59 ft. 7½ in.
Length passenger compartment	28 ft. 6½ in.
Length smoking compartment	11 ft. 1½ in.
Length baggage compartment	10 ft. 2¼ in.
Rear vestibule	5 ft. 9¾ in.
Width over sheathing	9 ft. 6 in.
Truck centers	36 ft.
Length of seats	41 in.
Center to center of seats	2 ft. 10 in.
Width of aisle	26⅞ in.
Seating capacity	56

The local cars are equipped with the same type of motor as the limited cars, but a two-motor equipment instead of a four-motor equipment is used, both motors being mounted on the front truck. The gear-ratio for these motors, however, is increased to 27 : 63, which gives a maximum free-running speed of 42 m.p.h. All the electrical equipment, including the lighting system and the auxiliaries, is operated by a storage battery, which is essentially the same as that on the limited cars.

The weight distribution of the local cars is as follows: Trucks, 25,000 lb.; electrical equipment, 22,600 lb.; body, 46,000 lb.; storage battery, 3000 lb.; air brakes, 2500 lb.; total weight, 99,100 lb.



MICHIGAN RAILWAY'S CARS—ALL-STEEL CAR FOR EXPRESS AND FREIGHT

STEEL MOTOR FREIGHT CARS

The all-steel motor freight cars are 61 ft. in length and they are equipped with the same heavy trucks and the same electrical equipment as the limited passenger cars. The gear ratio, however, is 23 : 67, which gives a maximum free-running speed of 38 m.p.h. With this gear ratio and four 150-hp. motors, these cars will pull a 500-ton trailing load, or will comfortably handle ten loaded freight cars. The body is arranged for single-end operation with 6-ft. sliding-door openings on each side at the center, a steel swinging train door at the center of the rear end and a swinging steel door on the right-hand side of the motorman's stand. The general dimensions of this car are as follows:

Length over bumpers	61 ft.
Truck centers	36 ft.
Width over sheathing	8 ft. 11 in.
Width inside	8 ft. 4⅜ in.

The most unusual feature of these freight motor cars is found in the arrangement of the underframing, which consists of six longitudinal sills continuous from bumper to bumper with transverse members only at the body bolsters and needle beams. In other words, the underframing is made up with relatively few transverse members and no diagonal bracing. The center sills are formed of 7-in., 17½-lb. I-beams, the intermediate sills of 7-in., 14¾-lb. channels and the side sills of 7-in. x 3½-in. x 9/16-in. angles. All these frame into the bumpers which are formed of 7-in., 14¾-lb. channels bent to a 5-ft. radius. The front end of this underframe is fitted with a ⅛-in. x 48-in. steel plate securely riveted to the bumper and the longitudinal members. This plate extends back from the bumper to the first cross-bearer and is employed as a reinforcement against buckling in collisions. The needle beams are formed of 8-in., 18-lb. I-beams spaced at 8-ft. centers and riveted to the lower flanges of all longitudinal beams.

The body framing includes continuous side posts and carlines formed of 3-in., 5½-lb. I-beams. These are sheathed on the outside with 3/32-in. patent-level steel plates, each sheet of which extends from the bottom of the side sill to the top of the letterboard. The latter panel is formed of ⅛-in. x 8-in. patent-level steel plate in a continuous piece from corner post to corner post. The vestibule sheets are also 3/32-in. sheet steel securely riveted to the body framing. The roof, which is of the plain arch type, is covered with ¼-in. fireproof Agasote bolted to the I-beam carlines and covered with No. 8 cotton duck. The inside of the car is sheathed with ⅛-in. steel plate extending from 6 in. above the floor to 48 in. above the floor. Above this plate and between it and the letterboard are two steel battens, ⅛ in. x 7 in. in section, securely riveted to the body framing. The car body is floored with 1¾-in. yellow pine and the doorways are fitted with 3/16-in. steel threshold plates. Other specialties in these freight cars include Tomlinson M.C.B. radial drawbars, condulets and steel shades of Crouse-Hinds manufacture, and General Electric automatic air brakes with C. P. 35 compressor. Completely equipped and ready for service this freight car weighs 110,000 lb.

In all the Michigan Railway has ordered eight cars of the limited type, six local cars and four freight cars. They were designed by the mechanical department of the Michigan United Traction Company, under the supervision of R. C. Taylor, master mechanic, and J. F. Collins, vice-president and general manager, and were built by the St. Louis Car Company, St. Louis, Mo.

Estimated Costs of Chicago Terminal Electrification

Those Sections of the Report of the Committee on Smoke Abatement and Electrification of Railway Terminals Which Deal with First Cost of the Introduction of Electric Operation Are Abstracted in Detail

The report of the committee of investigation on smoke abatement and electrification of railway terminals in Chicago was abstracted in last week's issue to show the committee's findings and to give in general the broad financial considerations involved by the project of electrification. In the following paragraphs those parts of the report that deal with the estimated costs are outlined in greater detail, so that an idea may be obtained as to bases used by the committee in arriving at its conclusions.

Three systems of electrification were considered throughout in the report; namely, the single-phase system, the high-voltage d.c. system and the 600-volt system. Neglecting the latter, as it is now generally recognized as impracticable for long-distance electrifications, the final costs on the two others are so close together that the choice between them may be said to be not worth considering in connection with the purposes of this abstract. For this reason, and to simplify the presentation, only the data that apply to the single-phase system will be reproduced.

Basis of Estimates

The committee's detailed analyses, underlying the estimates, of the cost of labor and material for electrification, are based upon statistics for the year 1912. Since the extent of trackage and the volume of traffic are increased each year the actual cost will depend to some extent upon the period which may elapse between the committee's statistical year and the beginning of construction, as well as by the duration of the construction period. A program of construction has therefore been assumed whereby actual work of electrification would begin in December, 1916, and would end in December, 1922. In the development of estimates of cost the values of material and labor necessary to meet conditions prevailing in 1912 have first been set forth. The estimates have then been increased to cover growth in traffic and trackage, contingencies, engineering and interest, insurance and taxes during construction, as controlled by this program of construction.

The rate at which Chicago's railroad trackage and traffic are increasing is established by the committee through records of previous years. The percentage used in extending the estimates provides for the continued growth of certain items up to the time when complete electric operation is to begin; namely, the end of the year 1922. Other aspects of the work may be assumed to be unaffected by the growth of the terminal after electrification has once been determined upon, but so long as the terminal is looked upon as a steam-operated terminal, structures will be built which serve only to accommodate steam locomotives and their trains, and the development will continue without much regard to the requirements of electrification. All such increase, however, should cease when the date of the initial work of electrification is once determined. This date, under the program governing the estimate, has been assumed to be Dec. 31, 1916.

The item entitled "contingencies," which appears in the estimates, is designed to cover incidental expenditures which may arise from sources difficult to anticipate, as well as costs arising from exceptional causes, such as future increases in the price of labor and materials. Another item included in the estimates is that of engineering, design, supervision and administration, the fact being generally recognized that the allowance for engineering may properly be differentiated for the several major items. An item also appears to cover interest, insurance and taxes during the period of construction, experience having shown that a flat rate of 1.75 per cent per annum for the entire period is justified in work similar to that contemplated.

Except in the case of land as a site for a central power station and of land for transfer yards, it has been assumed that there will be neither cost nor credit arising from transfers of real estate. The removal of steam locomotive terminals from the territory to be electrified makes available certain areas which may be sold or put to other uses by the railroad companies owning them. On the other hand, the necessity for establishing substations, inspection sheds for locomotives and multiple-unit equipment and other structures incidental to electric operation, will require land which in many cases is not now available.

In the development of the estimates it has been

CHICAGO ELECTRIFICATION—PARTIAL MAP SHOWING EXISTING STEAM LOCOMOTIVE TERMINALS

assumed that traffic will not be materially hindered and that the entire burden of cost imposed by local conditions will be borne by the work under construction. Also, no separate item has been entered to cover the cost of preliminary or experimental operation, as it is assumed that the contingency factor will cover this item. The trackage to be electrified includes 6.7 per cent of the total that is owned by local industries, but the costs as presented in the several summaries do not differentiate between the cost of equipping privately-owned tracks and those owned by railroads.

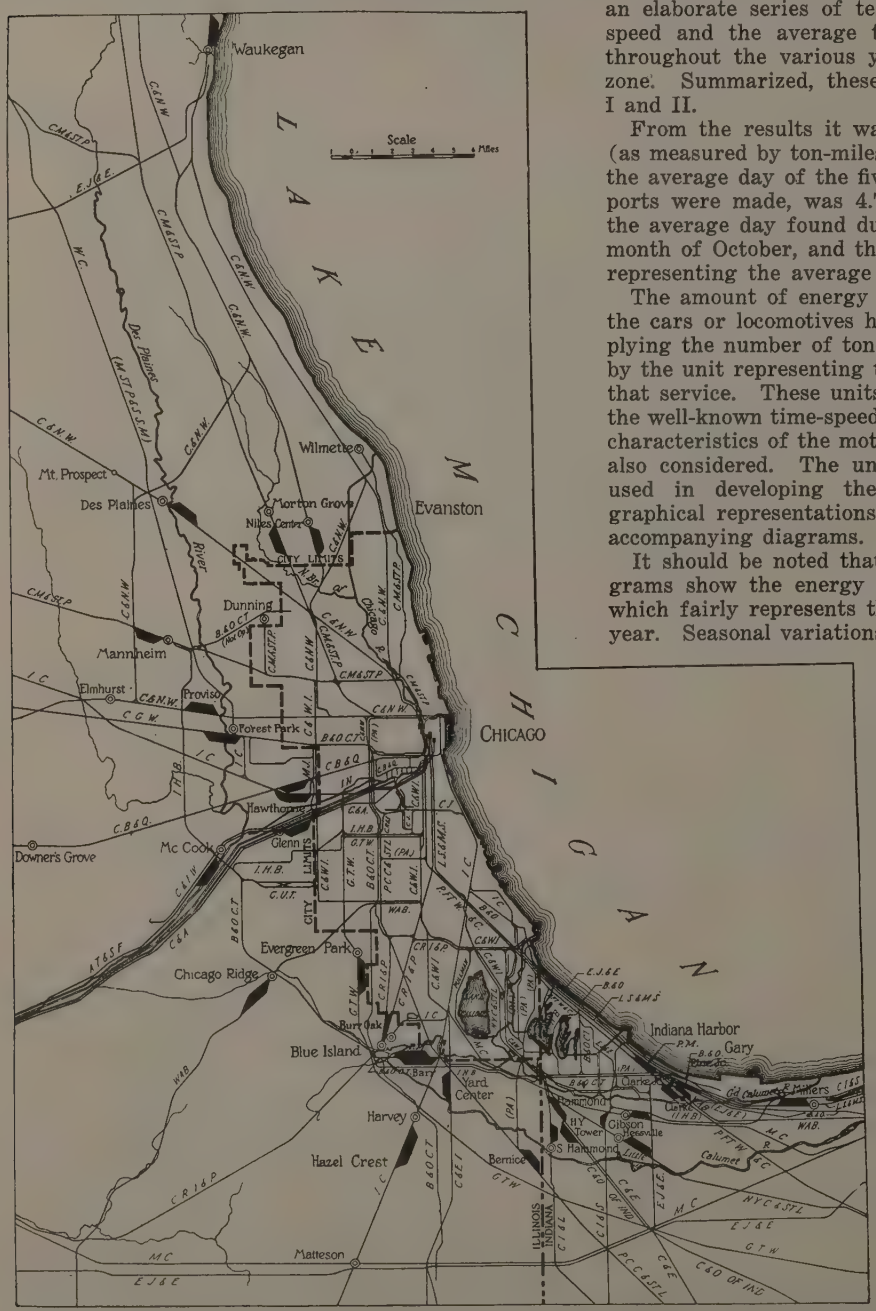
ENERGY REQUIREMENTS

The determination of the amount of energy required has been based upon a knowledge of the total volume of traffic to be handled within the proposed limits of electrification, and this knowledge was obtained by the committee through the results obtained by actual records of the railroad companies in combination with results obtained from tests. The records obtained from the railroads covered five separate weeks during different months of the year, the week of Oct. 8-14, 1912, being covered in greater detail than the others, as hourly records were made in addition to the daily totals. From these records data were obtained covering the locomotive-miles, the locomotive-hours, the weight of train in tons, the number of cars handled and the weight of coal consumed by every locomotive operating within the area covered by the investigations. The total of ton-miles, except in yard service, was determined directly from these reports. For determining the locomotive mileage and ton mileage of yard engines, recourse was had to an elaborate series of tests to determine the average speed and the average train load of switch engines throughout the various yards included in the electric zone. Summarized, these results are given in Tables I and II.

From the results it was found that the total traffic (as measured by ton-miles in all classes of service) for the average day of the five periods for which these reports were made, was 4.7 per cent less than that for the average day found during the report period in the month of October, and this has been accepted as fairly representing the average day for the year.

The amount of energy in kilowatt-hours required by the cars or locomotives has been determined by multiplying the number of ton-miles in each class of service by the unit representing the watt-hours per ton-mile in that service. These units were determined initially by the well-known time-speed-curve method. Curves of the characteristics of the motors of the type and sizes were also considered. The units shown in Table III were used in developing the loads in various services, graphical representations of these being shown in the accompanying diagrams.

It should be noted that the energy-consumption diagrams show the energy for the average October day, which fairly represents the average day for the entire year. Seasonal variations in the flow of traffic are not of great import, and calculations based on the daily records show that the load variation on a ton-mile basis for the average week is substantially 5 per cent above the average day, the record for Sunday being 23 per cent lower than the average day. In general, the maximum hourly loads for the various week-days are practically the same, and the difference in total daily loads is due only to a variation in the load factor. The ratio of the sum of the maximum hourly load of all the roads is 109,258 kw.-hr. and the maximum hourly load of the same roads operated jointly is 99,207 kw.-hr. The ratio between the two is 110 per cent, and this represents the diversity factor.



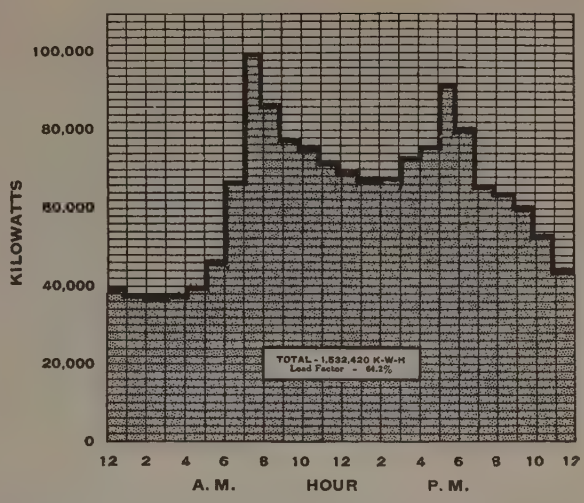
CHICAGO ELECTRIFICATION—LOCATIONS SELECTED FOR PROPOSED TRANSFER YARDS

DIRECT COSTS

As a matter of convenience in developing the estimates

TABLE I—SUMMARY OF TRAIN MOVEMENTS AND COAL CONSUMED BY STEAM LOCOMOTIVES AT CHICAGO

	Yard Service	Road Freight Service	Freight Transfer Service	Passenger Transfer Service	Passenger Service
Locomotive-hours of service for the average day	8,828	644	1,778	138	1,263
Locomotive-hours of service for the year	3,231,047	235,703	650,748	50,508	462,258
Locomotive-miles for the average day	28,604	6,026	10,127	1,067	23,769
Locomotive-miles for the year, millions	10.469	2.205	3.706	0.390	8.699
Ton-miles for the average day, millions	12.173	6.927	10.380	0.462	8.638
Ton-miles for the year, millions	426.28	242.47	363.33	16.19	302.03
Coal consumed for the average day, tons	3,635	665	1,261	59	1,167
Coal consumed for the year, tons	1,330,410	243,390	461,526	21,594	427,122
Coal consumed per locomotive-hour of service, pounds	824	2,065	1,418	855	1,848
Coal consumed per locomotive-mile, pounds	254	221	249	111	98
Coal consumed per 1000 ton-miles, pounds	597	192	243	255	270



CHICAGO ELECTRIFICATION—ENERGY REQUIREMENTS AT TROLLEY FOR ALL SERVICES

of first cost the whole problem of electrification has been divided into a series of studies, beginning with that of the power station.

Estimates have been based upon the use of water-tube boilers of 650 hp., these being equipped with automatic stokers capable of operating the boilers at a rating of from 200 per cent to 240 per cent of the normal rating, the peak loads requiring operation at a rating of 200 per cent. Seven steam turbines of the single-unit type will be provided, these operating at 1500 r.p.m. The generators will be of the 11,000-volt, 3-phase type, and transformers will raise the generator voltage to 33,000 volts. Reactance will be provided for feeders.

The average power station load for the maximum hour is approximately 115,000 kw. with an estimated power factor of 70 per cent, and the provision of seven 20,000-kw. turbo-generators, or an installed capacity of 140,000 kw. based on the usual maximum continuous rating, will allow the plant one spare unit. The power station characteristics and the load, assuming the use of the 11,000-volt, single-phase system of traction, are set forth in Table IV.

The estimated cost of this power station, excluding all allowances for contingencies and for engineering are as follows: Real estate, foundations, intake and discharge tunnels, and buildings, complete, $1,931,000; Boilers, stokers, pumps, chimneys, coal-and-ash-handling plant, and other boiler plant accessories, $1,571,000; Turbo-generators, condensers, switch-boards, exciters, transformers and other turbine-room accessories, $2,425,000. This makes a total cost for the plant of $5,927,000. The cost based upon an installed capacity of 140,000 kw. is $42.34 per kilowatt, and if an amount of 10 per cent is added for contingencies and 10 per cent for engineering, the cost becomes approximately $50 per kilowatt.

However, the estimated total cost of the power station for the electric operation of the Chicago terminals is based upon the cost of labor and materials as determined for the year 1912. If these costs are extended in accordance with the system that has been adopted in connection with the estimates, as previously mentioned, there should be added, (1) to cover growth in traffic and mileage of railroads from December, 1912, to December, 1922, 30 per cent; (2) to cover contingencies, 10 per cent; (3) to cover engineering, design, supervision and administration, 10 per cent; (4) to cover interest, insurance and taxes during construction for six years from 1916 to 1922, 10.5 per cent. The values thus derived may be accepted as the total cost on the basis of the requirements of the year 1922, so that the above-mentioned cost of $5,927,000 would be increased to $10,302,104 as the cost of the power station considered in these estimates.

For the transmission system between the power station and the substations located throughout the electrified district, the estimates are based upon the following general specifications: A voltage of 33,000 on all circuits; duplicate circuits to all substations; interconnection of substations with transmission lines to a reasonable extent; overhead open wire constructions located on the rights-of-way of the railroad transmission conductors supported on the structures of the contact system.

TABLE II—SUMMARY OF RESULTS RELATING TO OPERATION AND TRAFFIC WITHIN AREA OF INVESTIGATION

Average of	Yard Service	Road Freight Service	Freight Transfer Service	Passenger Transfer Service	Through Passenger Service	Suburban Passenger Service
Weight of locomotive and tender, tons	119	162	134	118*	174*	103*
Trailing load, tons	306*	988	811	335*	350*	167
Speed while in motion, miles per hour	5.4*	14.9*	8.1*	7.15*	27.1*	22.6*
Schedule speed, miles per hour	3.24*	9.37	5.66	4.82*	19.57	19.00
Ratio of time in motion to time in service, per cent	60.1*	78.4*	65.7*	67.5*	88.5*	87.9*
Length of run, miles	0.119*	2.80*	0.376*	0.22*	3.58*	1.21*
Weight of car and contents, including empties, tons	...	34.3	34.2	...	52.5*	27.8*

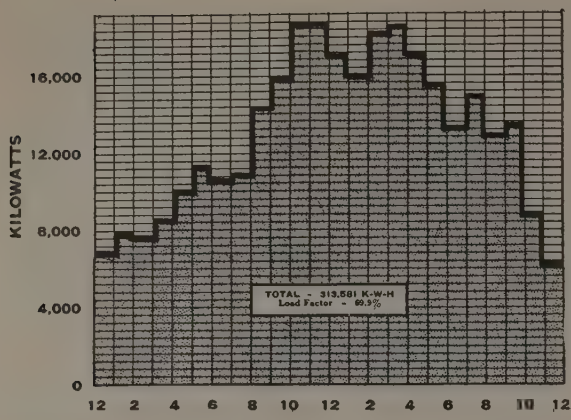
*Information from tests.

TABLE III—ESTIMATED UNIT CONSUMPTION OF ENERGY AT PANTOGRAPH

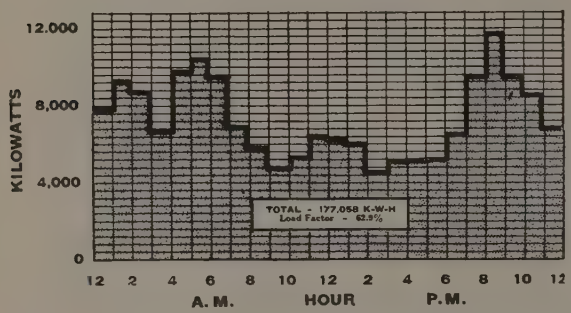
Service	Watt-Hours per Ton-Mile
Yard	60
Road freight	28
Freight transfer	38
Passenger transfer	30
Through passenger	37
Suburban passenger with locomotives	63
Suburban passenger with multiple-unit cars	71
Make-up and put-away	30

TABLE IV—POWER STATION CHARACTERISTICS AND LOAD

Peak load, one hour, kilowatts	114,600
Estimated power factor	70
Load factor, per cent	64.2
Output per day, kilowatt-hours	1,765,200
Output per year, kilowatt-hours	646,063,200
Number of generator units installed	7
One hour continuous capacity of unit, kilowatts	20,000
Maximum overload capacity of unit, kilowatts	27,000
Rating of six units in service on maximum load, kilowatts	120,000
Loading of generators during maximum hour, per cent	96
Total installed capacity, kilowatt	140,000
Installed capacity of step-up transformers, kilovolt-amperes	112,000
Maximum capacity of transformers for five minutes, per cent overload	200

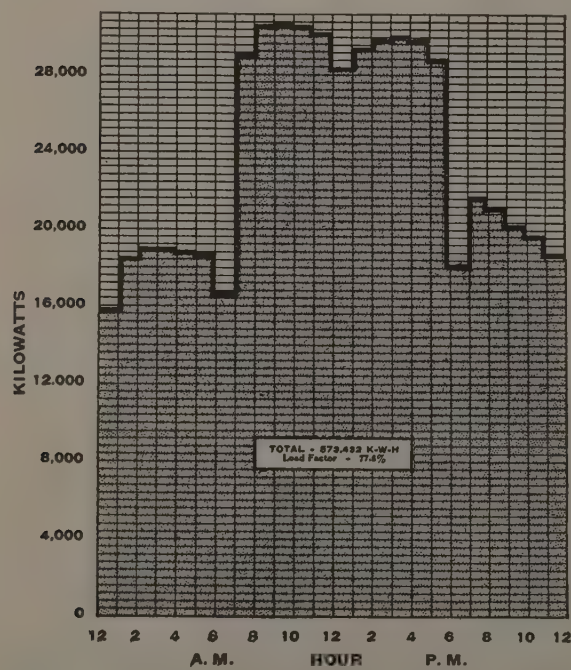


CHICAGO ELECTRIFICATION—ENERGY CHART FOR FREIGHT TRANSFER SERVICE

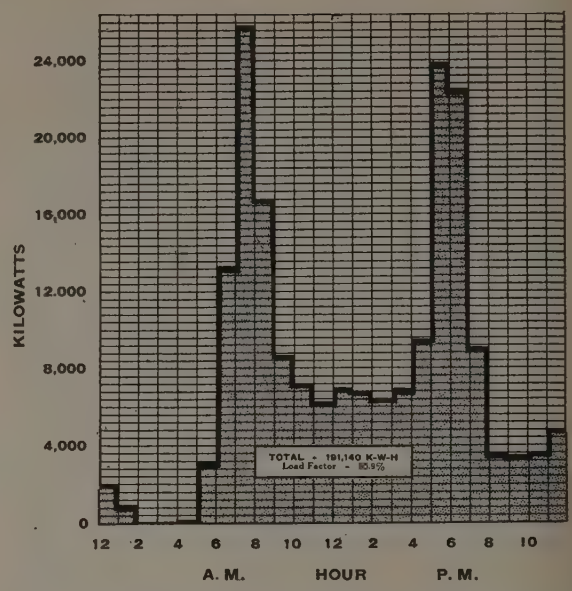


CHICAGO ELECTRIFICATION—ENERGY CHART FOR ROAD FREIGHT SERVICE

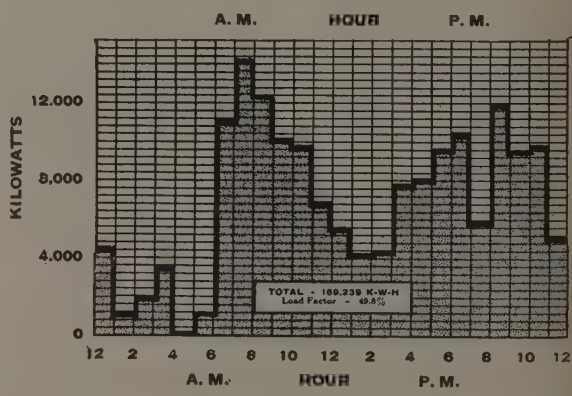
The make-up of the transmission system, allowing 5 per cent for sags, special crossings, etc., involves 950 miles and 2,036,000 lb. of wire. Approximately 500,000 lb. each of 250,000 circ.-mil. wire, No. 00 wire, and No. 1 wire are included in this total, the remainder being of intermediate sizes. The steel supporting structures for the overhead contact system are designed for the joint load imposed by the transmission line and overhead ground wires in addition to that of the contact system, duplicate circuits, where run, being carried on opposite sides of the track. The estimates of the contact system therefore include the



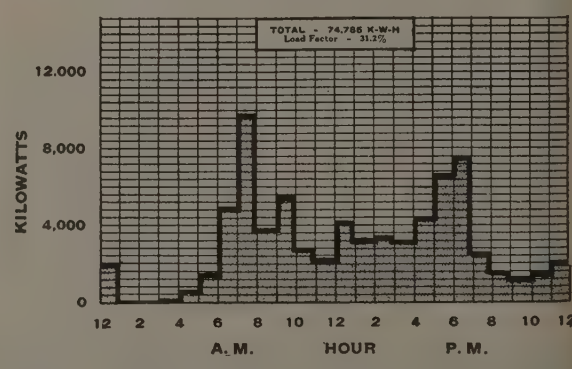
CHICAGO ELECTRIFICATION—ENERGY CHART FOR YARD SERVICE



CHICAGO ELECTRIFICATION—ENERGY CHART FOR SUBURBAN SERVICE WITH MULTIPLE-UNIT CARS



CHICAGO ELECTRIFICATION—ENERGY CHART FOR THROUGH PASSENGER SERVICE



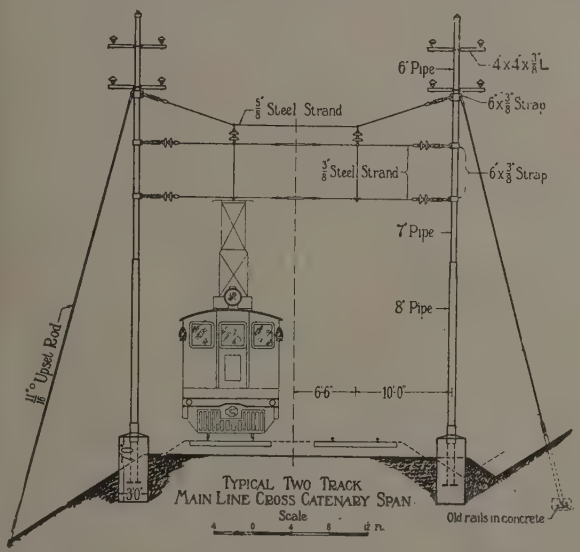
CHICAGO ELECTRIFICATION—ENERGY CHART FOR SUBURBAN SERVICE WITH LOCOMOTIVES

cost of a considerable amount of steel and concrete chargeable to the transmission system, but no attempt is made in the estimates to distribute this amount or to provide credit where the supporting structures do not carry transmission lines. A small mileage, 3.87 miles, of construction for independent supporting structures has been provided for in the estimates, the poles being spaced at intervals of 300 ft. with the lowest wire 30 ft. above the ground. Across navigable waters transmission towers giving a minimum clearance of 120 ft. above high water are provided for, there being twenty-nine of such locations within the electric zone. The estimated costs for this transmission system are given in Table V.

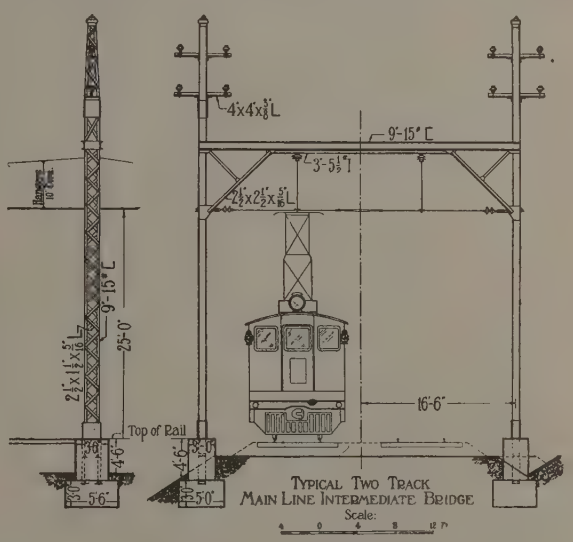
The estimated cost here given, amounting to $853,660 is, however, extended in the manner that has been followed throughout in the estimates by the addition of 30 per cent to cover growth of traffic, 20 per cent for contingencies, 10 per cent for engineering and 10.5 per cent for interest, insurance, etc. The introduction of these factors increase the above mentioned amount by approximately 90 per cent, or to $1,618,693, which price is entered in the estimate as the cost of the transmission system.

The estimates provide for thirty-one substations varying from 3000 kva. to 15,000 kva. The buildings are of brick and are located along the railroad right-of-way. Switches will be arranged for remote control from an adjoining signal tower or other building where some employee will normally be on duty, the cost of this being based on the assumption that the distance between the substation and control point will not average more than 1000 ft. Of the substations, sixteen are to be arranged to act as tie stations for the transmission lines. Altogether 207,500 kva. capacity of transformers will be needed on the basis of the year 1912, the cost being $1,164,870. However, when this sum is increased 30 per cent to cover growth and traffic, 10 per cent to cover contingencies, 10 per cent to cover engineering and 10.5 per cent to cover interest, insurance, etc., the total estimated cost for substations becomes $2,024,736.

Switching stations have been provided for in the estimates at various points throughout the terminals for sectionalizing the overhead conductors of the contact system and thus allowing conductors to be isolated in case of disorder due to overload, short circuit or other causes. The cost of this item comes to $329,700, but when the usual factors of extension are applied it rises to $573,073.



CHICAGO ELECTRIFICATION—OVERHEAD CONSTRUCTION PROPOSED FOR GENERAL USE



CHICAGO ELECTRIFICATION—CONSTRUCTION PROPOSED FOR NARROW RIGHT-OF-WAY WHERE GUYS CANNOT BE USED

Overhead Contact System

The type of overhead construction for main track which has served as the basis for estimates of cost consists of ⅝-in. stranded steel messenger cable, supported by structural steel bridges in cases where local conditions prevent the use of guys, and by cross-catenary spans similar to those used on the Norfolk & Western Railroad and described in previous issues of the ELECTRIC RAILWAY JOURNAL under normal conditions. These bridges, which are shown in the accompanying illustrations, are spaced normally at intervals of 300 ft. From the primary messenger cable a secondary messenger of No. 0000 steel wire is suspended by hangers spaced at intervals of 10 ft. and a No. 0000 grooved, solid-copper, contact wire is suspended about 2 in. below the secondary messenger, which supports it by clips placed midway between the hangers. For yard track a ⅜-in. stranded steel messenger cable is used, and from this a No. 00 grooved, copper contact wire is suspended by light hangers spaced at intervals of 15 ft. Over busy tracks a No. 0000 contact wire is used. The messengers are normally supported by cross-catenary spans located at 300-ft. intervals. Industrial tracks are provided with a 7/16-in. stranded steel messenger cable from which a No. 00 copper contact wire is suspended by ¼-in. hangers spaced at intervals of 15 ft., wooden poles spaced at intervals of 150 ft. being used for the supporting structures.

The quantity of the material and the cost of labor and the material required for the overhead contact system have been estimated for each class of track and the average cost per mile of track has been determined as a basis for estimating the total cost. In general, the cost of labor for erecting all main track longitudinal wire systems was estimated at $866 per mile of single track. The complete unit costs for labor and material for the overhead contact construction per mile of track are shown in Table VI.

For the yard construction it was necessary to make special estimates for ten different classes of yards and the estimated unit costs per mile were then applied to the various yards to be electrified in accordance to the

Table V—Estimated Costs of Transmission System

Copper wire	$377,000
Insulators	52,000
Erection of wire and insulators	84,000
Ground cables, material and erection	158,660
Structural steel and concrete in addition to that provided for contact system	22,000
Towers and foundations where bridges cross over tracks.	15,000
Towers and foundations at river crossings	145,000
Totals	$853,660

Table VI—Estimated Unit Costs of Labor and Material for Overhead Contact Construction per Mile of Main Track

Type of Support	Length of Span, Feet	Cost per Mile of Single Track—Two Tracks	Three Tracks	Four Tracks	Five Tracks	Six Tracks
1	2	3	4	5	6	7
Cross catenary, tubular poles, track in cut or on fill	300	$5,430	$4,800	$4,500	$4,370	$4,330
	250	6,014	5,160	4,914	4,780	4,708
	200	7,174	6,100	5,672	5,440	5,295
Intermediate strut bridge, track in cut or on fill	300	6,120	5,620	5,390	5,230	5,080
	250	6,821	6,257	5,956	5,737	5,579
	200	8,500	7,747	7,201	6,767	6,403
Intermediate strut bridge, supported in retaining walls	300	6,700	6,100	5,780	5,480	5,270
	250	7,518	6,817	6,419	6,097	5,809
	200	9,369	8,477	7,780	7,187	6,690

Table VII—Mileage and Estimated Cost of Overhead Contact System

	Mileage	Estimated Cost
Main track	1,475.59	$7,975,170
Other tracks	1,733.83	5,965,951
Private industrial tracks	229.72	899,869
Total for all tracks	3,439.14	14,840,990

particular class to which they belong. The estimated unit prices for yard construction range between $2,900 per mile and $5,600 per mile. Industrial tracks were covered by estimated unit costs which depended upon the length of spans and the length of spurs, a 1000-ft. spur involving costs that range between 70 cents per foot and $1.10 per foot, depending upon whether the length of span was 90 ft. or 45 ft.

By the application of these unit costs to the total mileage involved in the electrification it was determined that the total cost for labor and material for the overhead contact system would be as shown in Table VII.

To these costs are added the amounts involved by the introduction of the previously-cited factors of extension, which in this case are 30 per cent to cover growth in mileage, 20 per cent to cover contingencies, 10 per cent to cover engineering, etc., and 10.5 per cent to cover interest, etc., during construction. This increases the above-mentioned estimated cost to a total of $28,141,188 for the overhead contact system.

To protect employees riding on the tops of freight cars bridge warnings have been considered necessary wherever the contact wire has had to be depressed below the standard height of 25 ft. to clear an overhead obstruction. On high-speed lines an automatic device has been provided for, whereby the usual hanging ropes or rods will be raised by the action of the track circuits as the locomotive approaches and will be dropped back into position as soon as the pantograph has passed. For slow-speed tracks rods of light bamboo or similar material which may be deflected but not injured by the moving pantograph may be used. It is estimated that the automatic device should cost $500 per track for one side of an obstruction, and that the non-automatic warnings should cost $50. The cost of such devices for all necessary locations within the electrified zone was estimated to be $656,200, but this figure is raised to $1,071,989 by the addition of the customary factors of extension, which in this case are 12 per cent to cover growth in mileage from 1912 to 1916, 20 per cent to cover contingencies, 10 per cent for engineering, 10.5 per cent for interest during construction.

Bonding is provided for in the estimates on the basis that all bonds are to be of the protected type, installed under new splice bars with new bolts. The length of a bond is assumed at 24 in. in all cases, and expanded terminals in drilled holes are figured on throughout. Both rails will be bonded for main line tracks, but only one rail for yard and industrial tracks. Two bonds per joint are used in all cases, of a size ranging from 83,000 circ.-mil for 70-lb. rails or less, to 105,500 circ.-mil for rails between 85 lb. and 100 lb. in weight.

Cross bonding is to be installed at intervals of 1 mile on main tracks. The report states that yard and industrial tracks are to be cross bonded at intervals of approximately 1000 ft., although only one rail is to be bonded. Cross bonds will be of bare copper cable of 500,000 circ.-mil. size for main track and 200,000 circ.-mil. size for yard and industrial track.

The cost of joint bonding on this basis is estimated to be $385 per mile of main track and $190 per mile of yard and industrial track, the respective costs for cross bonding being $10 per mile and $17 per mile. To this is added the cost of substation connections at a unit price of $15 per mile of main track. Including the usual factors of extension, which in this case are applied at the rate of 30 per cent to cover growth, 20 per cent to cover contingencies, 10 per cent for engineering and 10.5 per cent for interest during construction, the total cost of the return circuit is estimated to be $4,446,033.

In connection with the return circuit the conclusion has been reached that inductive effects can be prevented by providing rather liberal bonding of track rails, by careful arrangement of feeding points, and by installing booster transformers in the railroad circuits. Neutralizing apparatus will not be required in the telephone and telegraph circuits. It will not be necessary for telephone and telegraph lines to be cabled or moved from the vicinity of the railroad circuits to any extent greater than that required to prevent physical interference. By locating substations at intervals of from 5 miles to 8 miles, the tracks will be divided into sections fed by substations at each end and the current drawn by trains in any one section will be confined to that section, the inductive disturbances being largely balanced out.

Booster transformers are to be located about 1 mile apart on main lines having heavy traffic and 1½ miles apart on main lines having light traffic. On this basis it is estimated that 325 booster installations will be necessary throughout the electrified zone, the cost of these being $525,650. To this figure, however, is added the usual factors of extension, which in this case are 30 per cent to cover growth in mileage, 20 per cent to cover contingencies, 10 per cent for engineering and 10.5 per cent to cover interest during construction. This makes a total cost of $996,727.

A complete telephone system has also been provided in connection with this electrification because it is considered essential that all elements of the electric installation be in close communication with one another. All of the line and equipment for this service will be installed and maintained by the local telephone company on a rental basis. However, radiating from certain important substations there are to be telephone patrol lines which will be installed and owned by the railroad company to provide for prompt transmission of reports concerning defects or troubles found by the men who will patrol the electric lines. Two stations per mile are to be provided along the electrified right-of-way and it is estimated that the average cost will be $300 per route mile. With the usual factors of extension the cost of this telephone patrol line will be $272,052.

Electric Locomotives and Multiple-Unit Equipment

In connection with the estimates of cost of electric locomotives the various locomotive services have been classified as yard, road-freight, freight-transfer and

TABLE VIII—CHARACTERISTICS OF THE STEAM LOCOMOTIVES IN SWITCHING SERVICE IN CHICAGO

Weight on Drivers, Pounds	Average Weight on Drivers, Pounds	Average Rated Maximum Tractive Effort, Pounds	Per Cent of Total Number of Locomotives
50,000 to 75,000	66,700	19,880	0.72
75,000 to 100,000	94,700	20,000	12.72
100,000 to 125,000	120,000	23,230	30.47
125,000 to 150,000	138,400	30,140	33.16
150,000 to 175,000	166,700	37,420	11.11
175,000 to 200,000	182,500	40,450	8.24
200,000 to 225,000	203,900	42,850	3.58
Average	135,900	28,790	100.00

through-passenger. The locomotives for yard service that are now in operation are of characteristics in accordance with table No. VIII. From tests made in sixty-six yards of thirteen railroads, however, and covering over 800 locomotive-hours of service, the average weight on drivers of the locomotives in service was found to be 138,000 lb. The average characteristics of this service have been previously shown in Table II. The weight of the electric locomotive for yard service has been taken for all systems as 160,000 lb., on all the drivers. The estimates are based upon a locomotive with two four-wheeled trucks, having geared motors of 120 hp. each, giving a normal rating of 480 hp. for one hour.

For the road-freight service the electric locomotive selected as a basis for estimates is similar to the yard locomotive except that it has eight motors, two of which are geared to each of the four axles. The total weight has been taken at 230,000 lb. The motors are each of 250-hp. capacity at one hour rating and will develop a tractive effort of 80,000 lb., or sufficient to slip the wheels at 40 per cent adhesion. This locomotive is capable of handling the average trailing load shown in Table II at an average speed of about 22 miles per hour, about 50 per cent more than the average speed of the present steam locomotive. The electric locomotives required for freight-transfer service, the character of which is shown in Table II, need not be different from the type selected for the yard service, and the heavier part of the freight-transfer service may be handled by the road-freight locomotives.

The electric locomotives for passenger service will have to handle a maximum trailing weight of passenger trains of about 900 tons. Most of the lighter trains and those having frequent stops are to be operated with multiple-unit motor cars, leaving the through passenger trains and suburban trains which go to points beyond the limits of electrification to be handled by electric passenger locomotives. The locomotive selected for this service is of the type used by the Pennsylvania Railroad at the New York terminal, having 2000 hp. of motors mounted in the cab above the wheels and driving the locomotive by coupling rods and side rods through a jack-shaft. The total weight will approximate 320,000 lb. and the normal one-hour rating of the motors will give a 24,000-lb. tractive effort at 31.5 miles per hour. This is the only type of locomotive selected for passenger service, the freight locomotives being available for passenger trains making frequent stops.

For the suburban service a motor car has been selected which, when fully equipped with two 250-hp. motors and with average seated load, weighs 117,000 lb. It is approximately 54 ft. long over the body and 64 ft. long over all and has a seating capacity for seventy passengers. The trailer cars have the same dimensions, will seat seventy passengers, and will weigh, with the average load, 88,000 lb. In each train a number ranging from three with an eight-car train to none with a two-car train, will be used, and this will permit speeds averaging about 5 per cent higher than those now common on the steam operation.

The required amount of equipment for each of the different services is made up on the following basis: For locomotive passenger service a study was made of the through passenger schedules, and a sufficient number of locomotives was provided for each railroad to protect all of its passenger trains between the city terminus and the point at which provision is made for the change of motor power, assuming that each train will operate on a schedule indicated by the time-table. For multiple-unit passenger service electric equipment was provided to give 10 per cent more seating capacity than the present service, assuming that each schedule would be maintained, as shown by the present time-tables. For road-freight service the number of locomotive-hours and trailing ton-miles for each railroad during each hour of the average day was made the basis. For yard and transfer service the basis was the number of locomotive-hours for each railroad during each hour of the average day.

In connection with the locomotive passenger service it was decided that for the purpose of protecting the schedule thirty minutes spare time would be allowed at the terminal for coupling or uncoupling and for getting the locomotive into position. Where the minimum requirement to protect schedules is four locomotives or less, the number has generally been doubled. On roads having twenty or more scheduled trains daily, one spare locomotive for each twelve appearing on the schedule is regarded as ample. It has been assumed that the electric locomotives will be in operation 80 per cent of the total time, the remaining 20 per cent being required for inspection and repairs. On this basis there will be required to provide for the 704 scheduled trains which make 12,460 miles daily within the limits of the electric zone a total of 228 electric locomotives. Of these, it is calculated that a minimum of 138 will be required to meet the schedules and that the remaining 90 will act as spares. The locomotives will therefore average about 55 miles per day or two and three-quarters hours of work.

For the multiple-unit passenger service, equipment will be required for a service that has been established at 661 suburban trains daily, making 11,328 train-miles with an average of 4.4 cars per train. To the number of cars required actually to protect the schedules, there have been added 15 per cent to provide, first, for inspection and repairs, and second, for exigencies such as extra service, accidents and bunching of trains. It has been assumed that each motor car will be available for service twenty-four hours per day, but that inspection and repairs will consume about 5 per cent of the total time. The number of multiple-unit and trailer cars required for suburban passenger service by the nineteen roads operating it will be as follows:

Average number of scheduled trains daily	661
Average number of train-miles daily	11,328
Total number motor cars	470
Minimum number to meet schedules	406
Spares	64
Total number trailer cars	251
Minimum number to meet schedules	214
Spares	37
Present number of suburban coaches	742

For the road freight service, which is defined as that which involves the movement of freight cars between points within and points outside of the proposed limits of electrification, the basis employed in determining the number of locomotives is the maximum locomotive-hours for each road for the average day. To the daily requirement was added 20 per cent to provide for inspection and repairs, and 5 per cent for exigencies of operation. On this basis, the number of electric locomotives required to handle the road freight service for the nineteen roads operating this service would be 100.

This number includes 20 spares, and the 80 locomotives for the minimum average service would haul 5,668,326 ton-miles in the 548 locomotive-hours of service required for the average day. The locomotive mileage for the day would be 5369, an average of 53 miles, or 5.65 hours per locomotive-day.

In yard service at the present time, 519 locomotives are ordinarily at work during the maximum hour and to this is added 113 locomotives in transfer service. In determining the total number of electric locomotives required to perform the yard and transfer service in the Chicago terminals it has been assumed that the traffic will have the same flow and that it will be handled in the same average loads and at the same average rate of speed as the present service. Upon this basis, locomotive-hour diagrams have been worked out for each road, and the number of electric locomotives required to handle the yard and transfer service of the road in question has been determined from these. One of the diagrams is presented in an accompanying illustration. To the average daily locomotive requirements thus determined there has been added 9 per cent to protect against the time required for inspection and repairs, and 11 per cent for possible exigencies of service and accidents. On this basis, the total number of electric locomotives required to handle yard and transfer service will be 688, of which 116 are spare engines, leaving a minimum requirement for the average day of 572, it being assumed that the average daily hours of work for each electric locomotive will be 16.5 as opposed to 14.5 hours for the steam machine.

The unit costs for the electric equipment, including cost of delivery in Chicago, are assumed as follows:

Yard locomotives	$33,000
Freight locomotives	50,000
Passenger locomotives	67,500
Motor cars	20,100
Trail cars	10,400

Based upon the requirements of 688 yard locomotives, 100 freight locomotives, 228 passenger locomotives, 470 motor cars and 251 trailers, the total costs of the equipment for Chicago terminals would be $55,150,400. To this is added $34,675 for seventy-three line inspection cars and $85,000 for seventeen repair trains. When the extension factors are added, the total figure becomes $91,703,557, the extension factors being 30 per cent to cover growth in traffic, 10 per cent for contingencies, 5 per cent for engineering and 10.5 per cent for interest during construction.

In the estimates a separate allowance was also made for spare parts for the electrical equipment, and this, including the factors of extension, amounted to a total of $485,343.

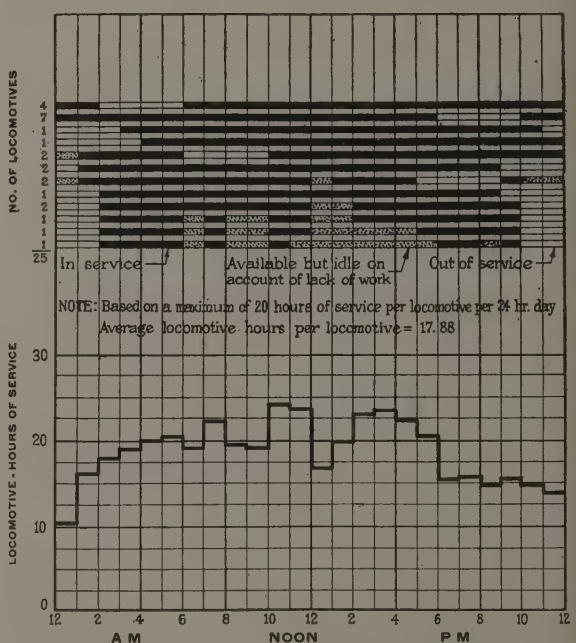
ALTERATIONS TO STRUCTURES

Incidental to the execution of any plan of electrifying the railroad terminals of Chicago through the use of an overhead contact system, certain definite and important changes in existing facilities of permanent structures will be required. Among these is the cost involved in securing the minimum clearance under overhead structures, and this is estimated to cost, with the factors of extension, $834,261. Changes have also been assumed to be necessary in all existing wires and cables which cross above the present tracks, or which parallel tracks in such a manner as to present possible physical interference with the contact system or transmission line. These changes are estimated to cost, with the extension factors, $2,028,007.

Changes in the existing signal systems have also been considered in the estimates owing to the extensive use of direct current signal apparatus. The total estimated cost for all roads affected amounts to $3,491,595. On the basis of the 1475 miles of electrified track, this would amount to $2,365 per track-mile. The factors of extension raise the total cost of the estimated changes in the signals to $6,111,407.

New steam locomotive terminals would have to be established at points beyond the city limits under the general plan of electrification. Provisions will also have to be made for the change of motor power at points outside the city and for the care and handling of electric locomotives and multiple-unit equipment. In a few cases the facilities which are now in use for steam equipment may be rearranged to accommodate electric equipment.

The principal existing facilities which will be rendered worthless to the railroad under electrification and will be abandoned include 42 roundhouses, 53 coaling stations and 96 water tanks. The original cost of these properties was $3,127,259 and the present value is $2,318,604. The salvage value of the property is estimated to be only $249,000. These figures apply, however, only to the year 1912. Subsequent to that


NO. OF LOCOMOTIVES
In service
Available but idle on account of lack of work
Out of service
NOTE: Based on a maximum of 20 hours of service per locomotive per 24 hr. day
Average locomotive hours per locomotive = 17.88
LOCOMOTIVE-HOURS OF SERVICE
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CHICAGO ELECTRIFICATION—TYPICAL DIAGRAM FOR DETERMINING ELECTRIC SWITCH ENGINE REQUIREMENTS

time, a rate of increase may be assumed at the rate of 3 per cent per annum, so that in December, 1916, when the electrification is assumed to be definitely decided upon, the value will have increased 12 per cent. However, to offset this there is a salvage value and by deducting this from the assumed value at the time when electrification commences a total amount of $2,317,957 is estimated as the amount which will be rendered useless in the event of electrification and which must stand as an independent item in representing property that is wholly dissipated.

Thirty-six roads will be provided with these transfer facilities, the total cost of which will amount to $19,617,000. Among the items that go to make up this cost are: buildings, $6,323,600; grading, $1,700,700; land, $1,254,500, and, machinery, $1,226,000. Elsewhere the estimates include a charge of $96,383 for the transferring of machinery from the old locations to the new ones. Other items included in the cost of new facilities are: Tracks, $3,490,290; electric equipment

TABLE IX—ESTIMATED FIRST COSTS OF TYPICAL STEAM LOCOMOTIVES

	Average Weight on Drivers, Pounds	Average Total Weight, Pounds	First Cost
Through passenger locomotives	144,000	314,000	$18,500
Road freight locomotives	160,000	324,000	18,500
Transfer locomotives	160,000	324,000	15,500
Yard locomotives	135,000	268,000	13,000
Suburban passenger locomotives	91,000	222,000	12,500

of new track, $597,000; viaducts and subways, $505,000; miscellaneous, $2,553,135.

In accordance with the custom followed in the estimates factors of extension have been applied as follows: To cover growth in the mileage of railroads 30 per cent, contingencies 20 per cent, engineering 10 per cent, interest during construction 10.5 per cent. The imposition of these factors raise the cost of the new terminal facilities to $37,197,383.

ROLLING STOCK RELEASED BY ELECTRIFICATION

The electrification of the railroad terminals in Chicago will result in the elimination of steam locomotives from the tracks of the city and its immediate vicinity. Locomotives thus released may be disposed of. Similarly, it is assumed that under electrification all suburban business which is confined to the electrified trackage will be performed by multiple-unit equipment, with the result that the cars now in this service will be released for other use.

A detailed analysis of schedule requirements shows that the introduction of electric operation will reduce by thirty-seven the number of steam locomotives required to perform the through passenger service. Within the electric zone, as before mentioned, this work is estimated to require 228 electric locomotives. In road freight service, under conditions imposed by existing schedules, the number of steam locomotives released will be 20, the estimated number of electric locomotives to do this work being 100, as before mentioned. In suburban passenger service all of the steam locomotives and coaches, numbering respectively 151 and 742, will be released. For yard and transfer service the number of steam locomotives in service was determined at 612 and 140 respectively, all of which will be released, the total of 752 steam locomotives being replaced by 688 electric locomotives.

The value of the locomotives to be released is based on the first costs of typical locomotives in the various services, these being outlined in Table IX. The value of suburban passenger coaches to be released has been based upon an average first cost of $5,200. The total first cost of rolling equipment to be released is thus $16,926,400. However, the number of locomotives and coaches to be released will increase as the business of the terminal increases, and a factor of extension of 21 per cent has been applied to cover growth at 3 per cent per annum for seven years, from December, 1912, to December, 1919. This brings the total estimated first cost of rolling equipment to be released up to $20,480,944.

However, the real release value of the equipment will not be equal to its first cost. The locomotives are estimated to have values ranging from 65 per cent to 40 per cent of the first cost. Many of the cars used in the suburban service are old, the average not being far from twenty years, and it has been assumed that $500 per car represents a fair average release value for such equipment. On this account the estimated release value of all rolling stock to be displaced in the event of electrification is $9,496,806, including the factor of extension of 21 per cent previously cited.

Summing up all of the foregoing cost of electrification it will be found that the total estimated cost is $187,902,916. In detail the summary is shown in Table X.

TABLE X—SUMMARY OF ITEMS COVERING INSTALLATION COSTS OF ELECTRIFICATION OF CHICAGO RAILROAD TERMINALS

Power station		$10,302,104
Transmission system		1,618,693
Substations		2,024,736
Switching stations		573,073
Overhead contact system		28,141,188
Bridge warnings		1,071,989
Return circuit		4,446,033
Prevention of inductive effects and electrolysis		996,727
Telephone system		272,052
Electric locomotives, multiple-unit equipment, work and inspection equipment		91,703,557
Spare parts		485,343
Changes in overhead structures		834,261
Changes in wire lines		2,028,007
Changes in signal systems		6,111,407
Removal and re-establishment of steam locomotive terminals:		
a. Cost of transferring machinery	$96,383	
b. New steam locomotive terminals and transfer yards	37,197,363	
		37,293,746
Total		$187,902,916

INDETERMINATE COSTS OF ELECTRIFICATION

The committee's estimates of costs above outlined are based upon a definite program of procedure and the estimates may be expected to work out in practice only insofar as the procedure is followed. This procedure has been designedly chosen to give results which may be expected, as those of minimum costs. However, in determining the extent of trackage to be electrified the committee's plan has been based upon the conception that electrification is proposed as a means of smoke abatement. The plan provides for the electrification of all tracks within the city and the termination of such electrifications as soon as practicable beyond the limits of the city. The railroad official who reviews the work will probably feel that if electrification is imposed the extent of trackage affected should be determined from considerations which are the outgrowth of operating conditions, whereas the committee has thought to deal with the minimum trackage consistent with reasonable operating requirements.

In addition, eight railroads have submitted statements of betterments which might be deferred for many years, but would become necessary at once if electrification were decided upon. The list of these precipitated costs covers items for grade separation, for an extension of four-track work where two tracks are now provided, for grade reduction and for changes incident thereto and for relaying rails in certain yards. Extensions of electrified trackage beyond the limits estimated on by the commitee are included. In round numbers, the sums of these respective items are $29,000,000 and $21,000,000, a total of $50,000,000, and the committee's estimate of the cost of electrification for the eight railroads is in round numbers $92,000,000. The excess costs, including those due to extensions of the electrified tracks and to precipitated costs are, therefore, 54 per cent of the amount covered by the committee's estimate, and on this basis the total precipitated costs will amount to $96,313,400. This, added to the figure in the committee's estimate, makes a total from all sources of $274,440,630. The total, it may be said, provides for a deduction of $9,775,686 to cover the salvage from rolling equipment and from facilities to be abandoned or utilized for the purpose. No allowance is made in the first costs for the dissipated values involved by abandoning steam engine terminals, this loss being considered as an operating charge pro rated over a period of ten years.

In connection with Electrical Prosperity Week in Louisville, the Louisville (Ky.) Railway ran a special car in the evenings, routed so as to cover practically the whole system, and gaily lighted so as to call attention to the signs it bore relating to the week of celebration. This car was rigged out by Jovian volunteers.

Papers Presented Before C. E. R. A. Accountants

Central Accounting Body at Sessions in Detroit on Dec. 7 and 8 Considered Topics Dealing with Depreciation and Appreciation, Accrued Accounts, Journal Entry Ticklers, and Shop Orders

The twenty-eighth meeting of the Central Electric Railway Accountants' Association was held on Dec. 7 and 8 at the Hotel Statler, Detroit, Mich. The first session, which opened on Tuesday afternoon, was devoted to an address by the president, H. B. Cavanaugh, auditor Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio; to reports of the various committees, including those on standing passenger and freight accounting and on forms, and to a paper on the subject of "Depreciation and Appreciation," by W. H. Forse, Jr., secretary-treasurer Union Traction Company of Indiana, Anderson, Ind. At the second and concluding session on Wednesday morning three papers were read, as follows: "Accrued Accounts," by A. E. Dedrick, auditor Mahoning & Shenango Railway & Light Company, Youngstown, Ohio; "Shop Orders," by B. H. Jacobs, assistant auditor Cleveland (Ohio) Railway, and "The Journal Entry Tickler," by E. L. Kasemeier, auditor Ohio Electric Railway, Springfield, Ohio. The address by President Cavanaugh and the papers by Messrs. Forse, Dedrick and Kasemeier are published below in abstract form.

ADDRESS OF PRESIDENT

BY H. B. CAVANAUGH, AUDITOR CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY, CLEVELAND, OHIO

The successful auditor of to-day must be versed in every line of operation on his property and must be in constant touch with and have the co-operation of all heads of departments and executives. He should originate forms for statistics and information to be furnished the different departments, and he should encourage the friendship of department heads by making frequent visits, by talking operating statistics with them and by showing an interest in their line of work. The association itself should encourage members of the different departments to attend its meetings, and papers should be presented by men who are not accountants, but who are associated with the companies in other capacities.

In regard to the forms now used by the member companies, it may be said that after several attempts had been made to have the different kinds collected and put into shape so that they would be of benefit, the committee in charge of this matter has adopted a system that takes care of all forms and classifies them as to use. This system is flexible, so that new forms can be substituted and old forms taken out at any time. The file of forms is kept in the office of the secretary, who will gladly furnish any information desired.

The question box seems to have been lost for some unknown reason. It cannot be possible that all understand the many intricate problems that are being presented daily, and this feature of association work should be revived. At the meeting in Cleveland on Dec. 13, 1913, the query box committee answered twenty-six questions, but since that time there seems to have been no questions asked. It would be of benefit to all if each member during the coming year would ask the solution of one or more problems, even though he may have solved them himself, as in this manner the members will put before the association questions that will be new to many.

At the last annual meeting it was decided to dispense with a separate secretary and to co-operate with the parent association. Accordingly, the secretary of the Central Electric Railway Association was elected as our secretary, and at a meeting in June we changed our constitution and by-laws to conform to those of the parent association, all of which has promoted the best of harmony. Members of the Accountants' Association should attend meetings of the parent body and keep in touch with its methods and requirements, as in this manner they will be better able to furnish the executive officers of their companies with the information they require. In regard to the representation of Accountants' Association on the parent executive committee, it is recommended that the question of having two members on this committee be taken up with the parent association—one member to be the president of the Accountants' Association and the other to be selected from the membership. One member should hold over in order to have continuity in the work.

The Accountants' Association has had before it for several years the question of a railway property doing a general lighting and power business, but there has been no recommendation as to the proper method of handling these accounts, *i.e.*, in the case of a railway property that has no separate organization or power plant for lighting and power work but handles it in connection with and through the general railway organization. It is therefore recommended that a committee be appointed to cover this business, which with many has grown to considerable proportions.

THE JOURNAL ENTRY TICKLER

BY E. L. KASEMEIER, AUDITOR OHIO ELECTRIC RAILWAY, SPRINGFIELD, OHIO

The Ohio Electric Railway auditor's office has a great many ticklers or reminders in various forms, such as a card tickler for the chief clerk to show the dates for statements, reports, etc., and a double tickler, indexed by dates and alphabetically, for periodical payments of the disbursement department. In line with such systems the general bookkeeper has a tickler for journal entries. This is kept in a book used for the general ledger trial balance. The book is divided into three sections; that is, one-third is allotted for the tickler; another for the trial balance, and the last for a condensed balance to bring the figures down in line with the monthly balance-sheet form. On the left-hand margin of the pages used as a tickler there is written a description of every entry. These are grouped in a systematic way, as follows:

Traffic and agents' accounts.

Power interchanged between light and railway departments and divisions.

Payrolls, vouchers, collection vouchers, drafts, credit advices, freight-claim drafts, ticket-refund drafts, etc.

Store issues, scrap issues, material reclaimed, fuel issues, stationery issues, etc.

Accrual entries for insurance, bond interest, taxes, etc.

Sinking funds.

Trust company's bond coupon deposit accounts.

Mortgage bond issues, changes, etc.

Vertical columns are headed by months, and when the journal entry is made its number is placed in the

month's column. If no entry is necessary, a dash is put in that place. For quick reference, journal entry numbers are not duplicated. As there are usually about fifty entries each month, 100 numbers are set aside for a month, as January, 5001; February, 5101; March, 5201, and so on indefinitely.

When the time for closing the books draws near, it is very easy of accomplishment to run the eye down the column for the month in question and see just what entries have not been made. This record is useful many times each month to locate certain journal entries and to refer to such as are made only once or twice each year. The vertical columns headed by months are made very narrow so that a page of the tickler book when opened will exhibit with the usual short leaf insert about six years' entries at a glance.

ACCRUED ACCOUNTS

BY A. E. DEDRICK, AUDITOR MAHONING & SHENANGO RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO

Accrued accounts are those which are used to place on the books such items, either actual or estimated, as will reflect as nearly as possible the true financial condition as of a future given date. Such accounts in general may be divided into two broad classes: (1) accounts that may be definitely determined each month, as bond and note interest, rentals, taxes and miscellaneous accruals, and (2) accounts that may be quite accurately estimated, as accident reserve, insurance reserve (where the utility carries its own insurance), depreciation and renewal reserve, taxes, uncollectable debt reserve, and many other accounts that are commonly used by utilities.

In the ordinary conduct of business the prorated accrual of bond interest is considered accurate, for the reason that the utility pays as much interest for February with twenty-eight days as for March with thirty-one days. Note interest, however, can be figured accurately, based on the number of days in each month. Taxes as a whole may be closely estimated. Some classes of taxation, particularly that applying to tax on gross earnings, can be accurately figured, as the base and rate are definite factors. Property and real estate taxes, however, vary so materially in different States and from year to year that actual accruals are not possible. Accruals for bad account reserve, insurance reserve, depreciation reserve and others may be closely apportioned by a careful analysis of conditions.

One form of accruals not ordinarily encountered in the daily routine of work should be considered. Assume, for example, a hypothetical case of a railway and lighting property being sold. In the final balance sheet set up by the company's accountants appears an accrual of $50,000 to cover the lag in continuous meter readings not shown on the books. The accountants for the purchaser, however, set up a counter charge of $25,000 for deferred or accrued operating expenses. This charge represents expense items that the company has secured benefit from but which have not been billed to it or taken on its books. Many items of the latter nature, such as maintenance of municipal bridges, paving repairs, etc., are not billed to a utility until months after the work has been done. Both of these accruals are correct in principle, though subject to adjustment as to the amount.

Closely allied with tax accruals are paving and sewer assessments, which usually accompany the tax bills to Ohio utilities. Yet these are not taxes in any sense of the word and are chargeable to capital or renewals, as the case may be. Some of the smaller companies charge paving assessments to operating expenses, prorating them over the year's business. This practice, however, is ethically wrong from an accounting standpoint, as it does not throw the expenses into the proper period. The accruing of a proper depreciation and renewal reserve would obviate this difficulty. In connection with assessments of this character, it is often advisable, where it can be mutually arranged, to have the municipality raise the funds and carry the account for three to five years before it is extinguished. The municipality can usually raise money at a lower rate than the utility, but the principal advantage lies in the fact that the burden may be distributed over a period of years and in many instances will be paid out of surplus earnings. Thus the utility is relieved of a burden of securities which, once issued, would probably be a liability against the property for a long term of years and impose a fixed charge that might be avoided.

DEPRECIATION AND APPRECIATION

BY W. H. FORSE, JR., SECRETARY-TREASURER UNION TRACTION COMPANY OF INDIANA, ANDERSON, IND.

It is impossible to frame concise general rules for making allowances for depreciation which will not, in their application, be attended with a large margin of possible error. Experience data collected from a number of electric railway accountants show the wide diversity of opinion of men in actual and direct contact with these carriers. The percentages in Table I are the various rates used for the year ended June 30, 1915, for the annual charge for depreciation on rolling stock equipment.

TABLE I—SHOWING VARIOUS ANNUAL RATES USED FOR DEPRECIATION OF ROLLING STOCK EQUIPMENT

Road No.	
1	An arbitrary charge of $1,200 per year.
2	4 per cent of original cost less estimated value of salvage.
3	6 cents per car-mile for maintenance and depreciation.
4	3 per cent of the original value.
5	5 per cent of the valuation of equipment.
6	An arbitrary charge of $3,600 per year.
7	3 per cent of record book value.
8	One twenty-fifth of 75 per cent of original cost. (Twenty-five year life; 25 per cent salvage.)
9	Arbitrary deduction from income; $500,000 per year for several years.
10	1 per cent of appraised value.
11	2 per cent of value.
12	3 per cent of cost of equipment.
13	1 per cent of gross value.
14	An arbitrary charge of $2,400 per year.
15	One twenty-fifth of 75 per cent of original cost.
16	5 per cent of value.
17	2 per cent of estimated value.
18	4 per cent of estimated cost less 25 per cent salvage.
19	2½ per cent of present value.
20	Arbitrary charge of $12,000 per year.
21	2 per cent of book value.
22	2½ per cent of inventory value.
23	An arbitrary charge of $1,000 per year.
24	5 per cent of appraised value.
25	6 per cent of gross income.
26	6 per cent of gross earnings for maintenance and depreciation.
27	Arbitrary charge of 4.3 per cent of investment.
28	5 per cent of appraised value less estimated salvage.
29	10 per cent of value.
30	5 per cent of estimated value.
31	2 per cent of book cost including betterments.

It is apparent from a study of the foregoing table that electric railway accountants have grappled with the problem and made a sincere effort to comply with commission requirements. It is likewise apparent that there is an honest difference of opinion regarding the life of rolling stock. The figures as they stand represent an expectation of life ranging from ten years to 100 years.

Table II on the next page has been compiled from electric railway reports and is merely inserted for the purpose of indicating variation of practice. It is inadvisable to jump at conclusions, however, in reading this table. Local conditions must be studied and every fact supporting the figures must be known before an intelligent opinion can be expressed regarding the adequacy or inadequacy of any figures or percentages of this kind.

It is an established fact that a railway system cannot be kept in an absolutely new condition. It may be maintained at 100 per cent efficiency, yet during the early years of its life the maintenance costs will vary considerably until it finally settles down to a practically constant percentage of wear and of depreciation and a practically constant expenditure for repairs and renewals. This leads to a consideration of the subject of renewals and its relation to maintenance and depreciation. Railway rolling stock especially is renewed and rebuilt until of its original component parts there sometimes remains scarcely a trace. One railway system is known to expend in nine years for repairs and renewals of rolling stock a sum equivalent to the total original cost of the equipment. It is quite possible, in this manner, to take care of depreciation through the maintenance and renewal of principal parts and the replacement of units in service. This method has been used very satisfactorily by some steam railways for years. Certainly the question of depreciation cannot properly be discussed without careful consideration of the items of renewals and replacements. In actual practice the use of depreciation accounts may be entirely unnecessary when renewals of principal parts and replacement of units in service have been adequately taken care of through maintenance (operating expense) accounts.

Table II—Maintenance and Depreciation as Shown in Published Reports of Electric Railways

	Percentage of Gross Operating Revenue		
	Maintenance	Depreciation (and Renewals)	Total
Boston Elevated Railway:			
Year ended June 30, 1914.....	17.1	None	17.1
Year ended June 30, 1913.....	18.1	None	18.1
Brooklyn Rapid Transit Company:			
Year ended June 30, 1913.....	16.0		16.0
Year ended June 30, 1912.....	16.3		16.3
Chicago Railways:			
Year ended Jan. 31, 1914.....	7.0	8.0 (renew-	15.0
Year ended Jan. 31, 1913.....	7.8	8.0 als)	15.8
Interborough Rapid Transit Company:			
Year ended June 30, 1914.....Items not shown separately			12.0
Year ended June 30, 1913.....Items not shown separately			13.9
Montreal Tramways:			
Year ended June 30, 1914.....	11.6	5.8 (renewals)	17.4
Philadelphia Rapid Transit Company:			
Year ended June 30, 1914.....	11.0	Renewals Res. 4.0	15
Year ended June 30, 1913.....	10.4	Renewals Res. 4.6	15
("Established policy is to set aside 15 per cent for maintenance and renewals.")			
Terre Haute, Indianapolis & Eastern Traction Company:			
Year ended Dec. 31, 1913.....	18.0		18.0
Union Traction Company of Indiana:			
Year ended Dec. 31, 1913.....	18.5	None	18.5
Year ended Dec. 31, 1912.....	19.7		19.7
United Railways & Electric Company:			
Year ended Dec. 31, 1913.....	9.8	5.9	15.7
Year ended Dec. 31, 1912.....	9.8	4.4	14.2
Washington Railway & Electric Company:			
Year ended Dec. 31, 1913.....Items not shown separately			16.3
Year ended Dec. 31, 1912.....Items not shown separately			15.9

The plan of accounting for depreciation of railway property, as required by the Interstate Commerce Commission, is neither scientific nor practical in application and operation. A railway which cost $100,000,000 to build and equip may own rolling stock which cost $10,000,000. Is it consistent to select one item of this great transportation machine, and write down its value month by month on a mere guess, while the remaining $90,000,000 of investment, much of it having enormously increased in value, is left undisturbed? Is it a good plan to inject so much of theory and estimate into the accounts of railways?

There was a Conference on Valuation in Philadelphia Nov. 10 to 12, 1915, at which Milo R. Maltbie, member of the advisory board division of valuation, Interstate Commerce Commission, advocated the inclusion of appreciation of land values as an item of income, to be credited as such, on the same theory that depreciation is allowed as a charge to operating expenses (Electric Railway Journal, Nov. 13, 1915). Yet the inclusion of appreciation of land values as current income, month by month, would be as impracticable and as hard to calculate as the wasting of property (depreciation of rolling stock) month by month. Why should either of them be included in the income account? Would it not be much more sensible to take care of such estimated fluctuations through the surplus account?

If, for example, the book valuation of the various units making up a railway property has not been increased by the estimated appreciation in value of portions of the property, such as right of way, roadbed, terminals, etc., and a book surplus has accumulated, is it not permissible to say that this ability to accumulate a surplus through the operation of the property proves the value of the property as a transportation machine? The existence of a comparatively adequate surplus generally warrants the assumption that replacement of worn-out physical property can be made as and when required by actual depreciation. A surplus may be built up as insurance against financial panic, disastrous floods and fires, and other exigencies as well as for assurance of the replacement of physical property at the termination of useful life. It is not reasonable or fair to assume that a corporation has not provided for depreciation merely because the balance sheet does not contain a separately-tagged depreciation—or replacement—reserve account. Its real surplus may, as a matter of fact, be adequate to take care of many other contingencies besides the wasting of assets or so-called physical depreciation.

A careful examination and analysis of the balance sheet is more important and will be more fruitful of results than mere theorizing regarding the depreciation of a portion of the physical property. Arbitrary regulations of the income account should not in justice be substituted for first-hand knowledge of property and earning values. In order to avoid the monthly arbitrary changes in operating expenses and net earnings, which are unavoidable under the commission plan of accounting, the surplus account should be used to reflect fluctuations in net worth when all the facts are known. If this were done, the use of the depreciation accounts required of railways under the plan now compulsory would be almost wholly unnecessary.

Supplement to the Trade Directory of South America

The bureau of foreign and domestic commerce, Department of Commerce, through the co-operation of American consular officers, has completed a revision of the lists of importers and merchants located in Buenos Aires, Bahia Blanca and La Plata, Argentina. These lists form a supplement to the Trade Directory of South America, which was published in 1914 as a section of the new edition of the World Trade Directory. In publishing the Trade Directory of South America, the bureau of foreign and domestic commerce was obliged to go to press without the list from Caracas, Venezuela. A revised directory for that city has been prepared by the American Consular Service, and is presented in this supplement, together with a later list for La Guaira, Venezuela. The supplement contains thirty-seven pages, and is sold at 5 cents per copy to cover partially the cost of printing. Those desiring one or more copies of this supplement should make application to the Superintendent of Documents, Government Printing Office, Washington, D. C., or to the branch offices of the bureau of foreign and domestic commerce. Money order or check should be made payable to the Superintendent of Documents.

Railway Conditions in California*

Only One of Twenty-five Electric Lines Paid Dividend Last Year—Plight of the Carriers Is Described and Causes Analyzed—How the Public Can Help to Better the Situation

BY PAUL SHOUP, PRESIDENT PACIFIC ELECTRIC RAILWAY, LOS ANGELES, CAL.

What is to be the future of the electric railways in California? Into these enterprises have been poured several hundreds of millions of dollars. The resulting railways have been, and are, great assets to the communities they serve. Yet according to the official statements of the operating revenue for each of the last three fiscal years of twenty-two electric railways of California, the revenues are insufficient. Out of twenty-five roads, just one electric railway paid a dividend to its stockholders last year and that had no bonded debt.

Condition of Properties

It may be said that while there are material reductions in gross earnings of the roads during the three-year period and marked reductions in the net earnings, yet these are not such as to imperil the properties. This possibly would be true were it not for two facts. In the first place, three years ago the interurban roads as a whole, and a number of the city lines, were not earning their fixed charges. They could afford to lose but little. In the second place, practically all of the roads have, in the three-year period, had to invest large sums of money because of public requirements, such as in paving and track reconstruction incident to paving, newer and much more expensive rolling stock, and many safety devices.

The interurban electric railways of California are not now earning, and have not during any one of the three fiscal years ended June 30, 1915, earned interest and other fixed charges upon the investment—that is, the money actually put into the properties and properly chargeable under the Interstate Commerce Commission classification to capital account. In other words, they have not earned the actual interest upon all the debts they owe, represented by funded and floating debts, or upon the reproduction cost of the properties to-day, the rights-of-way and other real estate being valued, not at reproduction cost but at original cost. The city lines are not much better off. The same statement might be made with reference to them, but their final income accounts for the last year are not at hand, nor am I so familiar with these city properties as a whole. It can be stated with certainty, however, that they are not prosperous. In short, it may be said that more than two-thirds of the electric railway companies of California did not earn their fixed charges last year. This is a serious situation to every community that is served by electric roads, as well as to the employees, the owners and every community that would like to have electric railway service.

Causes of the Present Situation

What are the causes of this condition? Some are uncontrollable. Some are those that other lines of business have to meet. The first is the business depression. The companies face that cheerfully; it is a condition which will pass. The second is the development of the automobile and the extension of the good roads. Privately owned and operated machines form a new and permanent factor. They have made serious inroads upon earnings, but they present a condition that must be faced. Likewise no fight can be made upon the good roads. They are a great asset to California, and in the end the State will reap great benefit.

Other causes, however, are open to criticism. For instance, notice paving expenses. With the advent of the automobile cutting into the revenue came the demand for better streets. People are not satisfied with the light paving as of old. Under the present Los Angeles city specifications, and this is simply to meet the demands of traffic, it costs at least $20,000 per double track-mile on an average just to pave the space occupied by the electric railways, and sometimes, depending on track centers, much more. There has been no such increase in earnings as to justify this increase in investment.

Tremendous investments are put in where there is no possibility of getting any considerable part of the capital back before the expiration of the limited franchises. The Pacific Electric Railway is now paving a section of Santa Monica Boulevard in the city limits, a little more than 2 miles long, at a cost of $225,000, according to the work order estimate, or more than $100,000 a mile. The asphalt paving will cost approximately $70,000. With a franchise expiring in thirty years, and connecting franchises expiring in a much shorter time, and with operating expenses and taxes, on the average, taking more than 70 per cent of the revenue, could it be proved that this investment would be a desirable one, especially as the section involved is in the further limits of the 5-cent fare territory and the rate per passenger is very low, probably not in excess of 1 cent?

The public is demanding this kind of construction, not only in this city, but in every city in California, and because of a very natural demand for good streets. But the question is, with decrease in revenue through automobile competition, both private and publicly operated, can the electric railways find the money to do this work? Is it right for them to risk other people's money in such an investment?

The second cause of present conditions is high taxes. The taxes paid by the electric roads have always been very heavy. If it takes two-thirds of the revenue to meet operating expenses it can readily be seen what a large proportion of the net earnings taxes are. Out of each $1 of revenue the railways now pay 5¼ cents to the State. This represents increases in the last few years as follows, in percentage:

Year	Percentage to State	Increase Over Previous Year
1913	4 per cent	17.8 per cent
1914	4¾ per cent	26.2 per cent
1915	4¾ per cent	3.9 per cent
1916	5¼ per cent	12. (estimated)

The Pacific Electric Railway last year paid on its operating properties $496,477 in taxes. Thus, of the money it had left after paying its operating expenses, more than 17 per cent went to taxes. Incidentally, it may be stated that this company did not earn its interest and fixed charges by $500,000.

The third cause is the greatly increased expenses due to the very proper precautions the electric railways are taking in connection with the safety-first movement. This includes installation and operation of safety de-

*Abstract of address delivered before Jovian Electric League at Los Angeles on Oct. 21.

vices, such as interlocking plants and signal systems, training schools and flagmen, and a higher standard in the operations all along the line. Wages on practically all of the interurban lines and upon a great many of the city lines have been increased in the last three years. No one has fault to find with these measures, but they involve expenses that must be met by increasing revenues.

The fourth cause is the jitney and motor truck competition. This, of the causes that can be controlled by the public, is most important of all. If these carriers are to take over the electric railway business or any part thereof, they must take over likewise the obligations and responsibilities of such carriers to the public. This is not true now. Jitneys in the cities are being regulated, but they have no such obligations yet as the electric lines have along the line of taxes, paving obligations, and service and fare regulations. The interurban jitneys are practically not regulated except as they come in contact with city regulation. But these various lines, city and interurban, are taking enough of the narrow margin in earnings that the electric railways have to threaten their investments and threaten their efficiency as carriers. It is idle to prove that a jitney is not an economic possibility. It is here just the same.

Where the Public Can Help

The difficulties that electric railways have to face in common with the public they will cheerfully face, but there are other directions where the public can help them and thereby help itself. If the situation is not changed, the electric railways cannot improve and extend their properties. Service must be curtailed and the weakest branches abandoned. This is not a matter of theory. Lines have been abandoned already, for the stronger lines, with unregulated competition and heavier burdens, are no longer able to carry the weak lines.

There will have to be material reduction in other directions in service wherever reductions can be demonstrated as saving more money than is lost through such reductions. This means a cutting down of employees on cars, in shops, on tracks, and in new construction. Not only do the men suffer, but the business of the whole community suffers.

Commutation rates have in many directions been made because it meant the settlement of the country and the creation of individual and round-trip traffic at higher rates. The head of the family would buy a monthly commutation ticket; the others would ride on higher-priced tickets. But if jitneys, without making commutation rates, are to enjoy the higher-priced traffic, then there will have to be a readjustment of the lower rates.

What, then, do electric railways expect? Let one's own conclusions be drawn from the following statements:

1. Electric railways in the State, in behalf of the people whom they serve, the people whom they employ, and those whose money they have invested, have a right to ask that competition of jitneys or motor trucks be asked to take on equal responsibility and obligations to the public.

2. One electric road is not expected to parallel another, or to take another line's passengers from its stations, but this is exactly what automobiles are doing in California. It is therefore very necessary in the interest of service alone to consider under what conditions this question of competition with the electric railways by jitneys should be allowed.

3. The electric railways have reached their limit under present conditions as to taxation. While earnings are being diminished taxes upon the gross income have been increased. Every dollar diverted from an electric road to an automobile, freight or passenger, means a loss of 5¼ cents to the State, and ordinarily, if within the city, some loss to the city likewise.

4. The electric roads will be unable to get money any longer to pave streets where poor earning lines exist. It is going to be a choice of abandonment under present conditions or modification with respect to paving expenses. Some cities are already realizing this, and where traffic is not heavy are permitting the use of less expensive pavement and not demanding that track be reconstructed.

5. Electric railways are in a quandary as to the rate situation. The public, however, is generally realizing that the railways must have revenues if they are to live, and southern California has been showing in this direction an intelligent appreciation of the conditions. It is probable that many rates will have to be increased.

Electric railways can continue to give good service and to expand if the present difficulties can be overcome, and this with fairness to the public. They can be. This is not a pessimistic talk, but a statement of the situation which must be known and considered if the constructive optimism that has made the electric railways is to be upheld by the people who have been most benefited. The questions raised are not party or political questions at all, but they are questions to be answered by the thinking public expressing its conclusions through governmental channels.

1200 Versus 600-Volt Trolley Systems

S. B. Fortenbaugh States Wherein the Merits of the 1200-Volt System Lie and Estimates Its Cost to Be from 10 to 20 Per Cent Less than the 600-Volt System

In a paper delivered at the recent White Springs meeting of the Public Utilities Association of West Virginia, mentioned in the issue of two weeks ago on page 1085, S. B. Fortenbaugh outlined the advantages of the 1200-volt system for interurban railways. He showed that there are no important compensating disadvantages. To illustrate his statements he gave the results of calculations for a 25-mile line with 5 miles additional in terminal cities, using 30-ton cars and making 20 m.p.h. schedule speed with one stop per mile between cities. Hourly service for eighteen hours per day was assumed.

With 1200 volts one substation of 600-kw. capacity would be required in place of three of 300-kw. capacity each at 600 volts. The load factor would be 20.8 per cent and 13.8 per cent in the two cases respectively, and the efficiency 77 per cent and 70 per cent. The daily energy saving due to the use of the higher voltage was 350 kw.-hr., or 10.4 per cent of the total.

With direct generation of d.c. power at 1200 volts as compared with a.c. transmission the saving in power is about 33.5 per cent, made up as follows: Step-up transformer loss, 3 per cent; transmission line loss, 2 per cent of remainder; "all-day" substation losses, 30 per cent of remainder. On the basis of 2700 kw.-hr. per day delivered to the trolley wire, and 1 cent per kilowatt-hour energy cost the money value of the saving is $13.50 per day or $4,930 per year. With a.c. generation and distribution the saving in cost of power is due to improved load factor. On the same basis this saving amounts to $3.50 per day or $1,280 per year.

At $100 per month per substation for labor, maintenance and miscellaneous expense the 1200-volt system saves $2,400 per year in substation expense.

The total saving is, therefore, $4,930 per year for direct d.c. generation and $3,680 for a.c. generation.

Capitalized at 5 per cent these savings are equivalent to additional investments of $73,600 and $98,600 respectively.

Mr. Fortenbaugh claimed that the net saving in the initial cost of "electrification material," i. e., cars, substations, transmission, trolley wire, feeders and bonding will vary between 10 per cent and 20 per cent in favor of 1200 volts. Practically the same result is indicated by the consideration of fixed charges, including depreciation, interest, taxes and insurance. The cost of operation also favors 1200 volts by from 10 to 15 per cent.

Cost of Miscellaneous Shop Equipment

In connection with the inventory recently filed by the Bay State Street Railway of Boston, Mass., with the Massachusetts Public Service Commission, as a basis for rate-making, a large number of data were submitted as to the cost of shop equipment. Representative items from the exhibits are given herewith, the cost installed being stated.

REPRESENTATIVE SHOP EQUIPMENT COSTS

Item	Cost
Campello, Mass.	
No. 0 Springfield car-wheel grinder	$1,455
Foundation for above	78
48-in. Niles-Bement-Pond hydraulic car-wheel press	1,335
Foundation for above	51
45-in. Putnam car-wheel boring machine	1,213
20-in. x 14-in. Bridgewater single-end axle lathe	1,145
Foundation for above	16
No. 14.5 Becker-Brainard vertical milling machine	918
20-in. x 12-in. Reed screw-cutting lathe	836
16-in. x 8-ft. Putnam screw-cutting engine lathe	466
36-in. Fosdick radial drill press	687
24-in. x 24-in. x 8-in. Whitcomb single-head planer	666
1.5-in. "National" single-head bolt cutter	312
Watson-Stillman hydraulic axle straightener	290
16-in. Phoenix single-head traverse shaper	270
New Yankee drill and reamer grinder	146
26-in. Barnes upright drill press	174
24-in. Hoefer upright drill press	137
No. 8 Buffalo hand-operated shears	66
No. 6 Blount tool grinder	58
No. 3 Royal power hacksaw	36
12-in. power hacksaw	22
8-in. x 3-ft. bench speed lathe	28
24-in. x 4-in. power grindstone	22
"CP-22" G. E. air compressor	140
No. 3 Beaudry belt-driven hammer	441
Sturtevant down-draft forge	24
No. 5 Sturtevant suction fan	61
No. 3 Sturtevant Monogram fan	45
8-in. x 8-in. straight line air compressor	298
Foundation for above	31
150-ton hydraulic car-wheel press	835
Columbia banding machine	308
10-kw. G. E. Type H transformer	99
Wire retaping machine	15
20-in. single-surface planer	207
20-in. x 8-ft. American pattern maker's lathe	162
No. 1 American mortiser	160
16-in. Oliver wood jointer	144
40-in. x 45-in. American Universal saw table	138
36-in. White band saw	134
38-in. x 50-in. American saw table	93
No. 3 soft metal furnace	50
2-in. pipe-bending machine	127
44-in. x 34-in. Fairbanks standard portable scales	69
15-in. Hendy pillar shaper	230
14-in. x 4-ft. Garvin speed lathe	45
Singer sewing machine	37
4-in. x 6-in. Deane vertical triplex pump	238
15-hp. vertical fire-tube boiler	192
Torrey Street Carhouse, Brockton	
1.5-in. centrifugal pump	39
Type H-6 National air compressor	451
No. 660 Buffalo portable forge	41
24-in. Columbia portable air pit table	153
North Abington Carhouse	
35-in. x 36-in. Sturtevant blacksmith's forge	25
Fall River Shops	
20-in. x 10-ft. Lodge-Davis screw-cutting engine lathe	697
12-in. x 4-ft. Dexter screw-cutting engine lathe	227
24-in. x 24-in. x 6-ft. Flather single-head planer	566
No. 50 Wiley-Russell bolt cutter	256
22-in. Prentiss upright drill press	160
12-in. x 2-in. small tool grinder	55
5-hp. G. E. d.c. motor	157
Size B Fairbanks belt-driven hammer	322
21-in. hand-operated armature press	103
Banding machine	15
1.5-ton hand-operated traveling crane	163
Wheeler & Wilson sewing machine	16
Whittenton Shop	
41-in. x 49-in. White variety molder	$165
36-in. Collins & Greenwood bandsaw	105
12-in. Baxter wood jointer	134
20-in. Snyder upright drill press	66
No. 2 Buffalo flat iron shears	41
No. 5-A Fox universal wood trimmer	29
Taunton Carhouse	
22-in. Superior upright drill press	118
29-in. x 30-in. Champion blacksmith's forge	21
7.5-in. x 4.5-in. x 10-in. Blake duplex steam pump	194
30-in. x 4-in. power grindstone	33
Washington Avenue Shops, Chelsea	
No. 6 Becker-Brainard vertical milling machine	1,358
No. 3 Hendy universal milling machine	1,125
21-in. Gisholt turret lathe	590
22-in. x 22-in. x 6-ft. Flather single-head planer	512
36-in. Drises standard radial drill	685
23-in. Snyder upright drill press	190
Combination drill and surface grinder	146
12.5-in. x 2-in. tool grinder	60
36-in. Passburg vacuum drying and impregnating equipment	2,801
26-in. x 12-ft. Blaisdell screw-cutting engine lathe	926
20-in. x 10-ft. engine lathe	697
18-in. x 10-ft. engine lathe	630
18-in. x 8-ft. Huntoon screw-cutting engine lathe	319
14-in. x 6-ft. engine lathe	237
75-ton Watson-Stillman vertical hydraulic armature clamping press	623
20-in. Superior upright drill press	109
12-in. sensitive high-speed drill press	39
Ridlon armature banding machine	270
Armature removing cradle	80
Wire-retaping machine	52
26-in. Niagara foot-power shears	17
Field coil winding machine	183
Armature coil winding machine	183
Armature coil taping machine	65
7.5-ton pneumatic press	121
48-in. 300-ton, Niles-Bement-Pond motor-driven car-wheel press	1,540
36-in. Putnam car-wheel boring machine	1,035
Foundation for above	8
10-in. x 1-in. Union tool grinder	60
16-in. Flather crank shaper	230
1.5-in. Wells single bolt cutter	255
46-in. Blaisdell heavy upright drill press	432
4-in. geared power shears	75
11-in. x 24-in. Wood dimension planer	545
Universal wood worker	170
Double spindle wood shaping machine	170
Smith reciprocating vertical mortiser and borer	160
36-in. band saw	155
36-in. x 37.5-in. double revolving universal saw bench	137
8-ft. Type B Oliver swing cut-off saw	106
42-in. x 60-in. double arbor combination saw table	93
42-in. Niles-Bement-Pond motor-driven car-wheel lathe	8,158
Foundation for above	99
500-lb. Beaudry belt-driven hammer	441
Harrington hair comber	36
4.5-in. x 2.75-in. x 4-in. Worthington duplex feed pump	54
No. 1 Champion blower	15
Singer power sewing machine	53
Randall leather creasing machine	15
No. 6 hand-operated wood trimmer	41
4-ton Yale & Towne electric hoist	365

The above costs are those obtaining in particular cases and extend through a considerable period, the latest installation listed being as of Nov. 1, 1914. The costs are not necessarily current prices, but are of value as showing the actual money outlay required for the tools specified.

Petrol-Electric Car for New Zealand State Railways

The New Zealand Government is preparing to handle the suburban passenger traffic on the State Railways in this Dominion in a more economical and satisfactory way than by the usual steam operation, and with this end in view has ordered a 200-hp. petrol-electric car from the Thomas Transmission Company, an English firm. Elasticity in power output is obtained by using the motor to generate electricity which is then employed through an electric motor. At low speeds the electrical machines are used, but when the car has reached a speed in which the motors can be run at economical speed geared directly to the wheels a direct mechanical drive comes automatically into operation, the more complicated electro-mechanical drive being automatically cut out. During trials in Birmingham, England, the engine hauled loads of 120 tons and 200 tons. It is designed for a speed of 40 m.p.h. on the level and will be capable of pulling a trailer.

COMMUNICATION

The Single-Phase Repulsion Motor

GENERAL ELECTRIC COMPANY
SCHENECTADY, N. Y., Dec. 3, 1915.

To the Editors:

I have read with great interest the article in the issue of the ELECTRIC RAILWAY JOURNAL for Nov. 13 and the editorial in that for Nov. 20 commenting on the single-phase equipment of the Philadelphia-Paoli electrification. In these articles are pointed out the advantages of using the repulsion starting, single-phase motor which is operated at full speed in a double-fed connection, which has otherwise been called the series repulsion connection.

This development is of no less interest to the writer because the system used is very familiar, and for the readers of the ELECTRIC RAILWAY JOURNAL who may have forgotten I should like to call attention to an article in your issue for Oct. 11, 1913, page 677, where there is a description of a General Electric single-phase motor equipment which at that time had already been for several years in successful operation on the New Haven road. A large single-phase locomotive which is now in operation on the New Haven road is also described. In this article the diagram of connections for these equipments shows the method of operation in starting as repulsion motor and operating as series repulsion or double-fed motor, and the experience with these equipments has fully borne out the predictions of the writer before the American Institute of Electrical Engineers in January, 1908, announcing the first railway equipment of this kind.

E. F. W. ALEXANDERSON.

Bad Advice to Women

Prominent Women's Journal Criticised for Discouraging Direct Settlements and the Giving of Testimony in Accident Cases

In its issue of November the *Ladies' Home Journal* published the following editorial:

> The law is a maze to most women. But every-day law touches nearly all women at some time, and it is wise for them to bear these very simple law points in mind:
>
> First: If you are injured in any accident—automobile, trolley, railroad or what not—never settle a claim for damages with the person who has injured you. Refer the person or company to your lawyer, but don't settle it yourself no matter how much money is offered you.
>
> Second: If you see an accident, and a conductor or a bystander asks you for your name and address as a witness, remember you don't have to give them to him. He has no right to ask them of you: it is your privilege to refuse. If you give your name and address you must be prepared, in case of a suit, to be summoned into court as a witness.
>
> Third: If you discharge a servant and she demands a week's or a month's wages, it is your privilege to give them to her, but there is no right on her side. The law is that where a servant is discharged for cause, he or she is only entitled to the wages due up to the time of discharge.
>
> Fourth: Never buy real estate until the property or the deed has been carefully looked over by a lawyer or a trust company.
>
> Fifth: Never sign a legal document of any sort until a lawyer has looked it over.

The first two recommendations in this editorial have naturally created a great deal of unfavorable comment among claim agents and those actively engaged in the class of work involved in the editorial. Among others to whom the advice seemed most pernicious is C. J. Franklin, formerly general superintendent Portland Railway, Light & Power Company and now a consulting engineer in Portland, Ore. Mr. Franklin has written a letter on the subject to the editor of the *Ladies' Home Journal.* Among other things he says:

"I am sure that it was with no intent to hamper industry or injure any class of people that you gave the advice contained in the first and second recommendations in the editorial. I, therefore, attribute these recommendations to unreliable or insufficient information upon the subject.

"I take it that where you say in your first recommendation: 'Never settle a claim for damages with the person who has injured you,' that you refer not only to the person in charge of operating the vehicle at the time but also to the claim agent, official or other authorized representative of the company. Your recommendation is very clear in referring the injured person to a lawyer before taking any action.

"Experience has shown that this theory does not work out well in practice. Advice of this character might be all right for those who are in the higher circles of society and finance, who wish to avoid the detail connected with a claim for an injury and who have representative attorneys to handle their legal affairs on a guaranteed fee. But for the great majority of people who have never had occasion to consult an attorney, and do not know whom to consult, the services of the high-class attorney, previously mentioned, is not only beyond their means but this class of litigation on a contingent basis is not attractive to them. The consequence is that, as a rule, they fall into the hands of one of two classes of attorneys.

"The first of these is those attorneys who are perfectly reliable but not prosperous or financially able to take a case where the fee is not guaranteed. They therefore follow a contingent plan, charging as high as 60 per cent of the amount recovered, an amount entirely out of proportion to the services rendered, and suit is instituted for an amount which is wholly inconsistent with the damage sustained by the client.

"The second class of attorney is unscrupulous. He makes a business of handling this class of work and also charges on a contingent basis. He will distort and even go so far as to manufacture evidence in order to further his end.

"In either case, should the injured person recover damages the amount that he or she receives, after all expenses have been paid and the contingent fee of the attorney deducted, is almost always less than the company through its agents have offered the injured person, to say nothing of the trouble, publicity, anguish and loss of peace of mind sustained by reason of a law suit. It is a case of 'if you win you lose.'

"Your second recommendation tends to discourage witnesses from giving their names and is unfair and unjust to all concerned. Under the law all are entitled to a fair trial which is based upon the testimony of those who are in a position to know the facts, and surely, this includes eye witnesses to an accident. Would it not be just as unfair to the injured person whose friend was trying to secure the names of eye witnesses to an accident in order to ascertain the facts as it would be to the railroad company whose representative is trying to do the same thing for its protection?

"Little is known by the average citizen of the trials, tribulations, impositions, ambulance chasers and fake accident claims with which public utilities have to contend, and it is for their protection, not to escape from liability, that reasonable instructions are given to employees what to do in case of accidents and how to prevent them.

"The claim agent of a public utility is instructed never to evade liability and to use every effort to settle a case before resorting to the law. The consequence is that the cases which find their way to the courts may be divided into three classes: First, where there is no liability on the part of the utility; second, where there is liability and the claim for damages is out of proportion to the injury, and, third, fake cases. The latter in-

clude the cases of those who follow the occupation of getting injured in order to collect damages, manufacture their own testimony and supply their own witnesses at trial.

"I think that I am well within the bounds when I say that if your instructions were followed throughout this country, the public utilities engaged in transportation services would be in the hands of receivers, on account of increased claims for damages, in a very short time."

Successful Tests on the St. Paul

A number of actual speed and tonnage tests were made on the completed section of the electrified mountain divisions of the Chicago, Milwaukee & St. Paul Railway on Dec. 8. The passenger train tests were made by one of the new 260-ton locomotives drawing three special cars and running at various speeds up to 70 m.p.h., and the tonnage tests with the freight locomotives included pulling 2500 tons at a uniform speed over various grades at 16 m.p.h.

The railway officials witnessing the tests included A. J. Earling, president of the St. Paul Railway; H. B. Earling, vice-president; H. R. Williams, vice-president; C. A. Goodnow, assistant to the president; Percy Rockefeller, nephew of John D. Rockefeller; John D. Ryan, the copper magnate; A. J. Pettit, Charles W. Harkness and Donald Gedkes, all members of the directorate. A. H. Armstrong and other General Electric officials were also present. At the conclusion of the tests President Earling and the other officials declared them a complete success. The regenerative braking tests made recently, as described on page 1037 of the issue of this paper for Nov. 20, were repeated and proved under actual tests to be completely satisfactory. In fact, it is reported that the economy of this system was made very apparent to practical railroad men in the party, who saw the use of air brakes made unnecessary except at station stops and in emergencies, an enormous saving resulting in reduced wear and tear on track equipment and the elimination of constant grinding of brakeshoes on the wheels.

It is anticipated that the all-steel continental trains of this company will be operated electrically over the continental divide shortly after the first of the year.

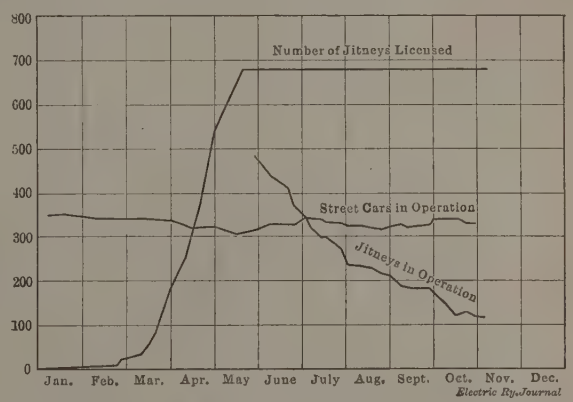
Rochester Jitneys Operate Despite Thompson Law

In Rochester, N. Y., a rather unusual situation has arisen in connection with the Thompson bill, passed by the New York State Legislature for the purpose of regulating jitney buses. This law makes it necessary for all persons and corporations owning and operating stage routes, bus lines, or motor vehicles carrying passengers for a fare of 15 cents or less upon any public thoroughfare in any city of the State except the city of New York, to procure, first, the consent of the local authorities and, next, a certificate of convenience from the Public Service Commission.

The law went into effect during May of the present year. At that time a number of jitney buses had been granted licenses by the city of Rochester, and subsequent to this the jitney operators made no attempt to secure permission from the Public Service Commission for the continuance of their operation. At the present time, therefore, the Rochester jitney buses are operating in direct defiance of the terms of the law, at least in so far as regards the requirement for a certificate of public necessity and convenience from the commission.

This situation may be explained through an opinion which was drafted by the assistant corporation counsel for the city of Rochester, in which it was held that the licenses which had been issued by the city gave the jitneys a legal right to operate there until the expiration of the licenses, or Jan. 1, 1916. This opinion was based on the alleged failure of the Thompson bill to provide any retroactive clause, as it was maintained that nothing appeared in the statutes to indicate that the law had a retroactive effect or was intended to invalidate acts done under laws in existence previous to its enactment. No doubt was expressed that the licenses granted by the city were revocable, but it was held that while these licenses were in force they gave the holder the right to operate in the streets. As a result of this opinion, the city did nothing more to enforce the law than to stop issuing licenses to jitney buses subsequent to the month of May, as indicated in the accompanying graphic record of the jitney movement in Rochester.

These licenses had been issued to the jitney buses on the same basis that the city issued hack licenses, the license fee being $1 and covering the period of one year.



GRAPHIC RECORD OF THE JITNEY MOVEMENT IN ROCHESTER

Certain police regulations were established for the license holders, but owing to the great difficulty of enforcement these have had very little effect, especially in regard to compelling the jitney buses to maintain fixed schedules and routes, and to stop only at authorized points along the streets.

Notwithstanding this practical absence of regulation, the number of jitney buses has decreased with extraordinary rapidity. The records covering the number of jitneys in operation were commenced late in the month of May, the number at that time being close to 500. At the present time only 120 jitneys are in service, the reduction being at a practically constant rate. Prior to the time that the records were instituted the number was estimated to have reached a maximum of 800, and in view of the rapid decrease it is probable that the movement will die out of its own accord even though the Thompson bill has been rendered ineffective.

At present the city's plan is to increase the license fee, after Jan. 1, to $50 per year, for any jitney buses that can secure the right to operate from the Public Service Commission. In connection with the matter of licenses for the ensuing year, the jitney bus operators recently appeared before the City Council for the purpose of getting the fee established at as low a figure as possible. At the same time the data contained in the accompanying illustration were submitted before the Council by the railway company, the record of the number of cars in operation being submitted to show that the street railway company had not been able to decrease its service notwithstanding the jitney's spasmodic inroads into its gross receipts.

American Association News

Tentative Programs for Denver Company Section Meeting Announced—The Connecticut Company Forms Section with 150 Members—Meeting of the Chicago Section—Manufacturers' Association Notes

PROGRAMS OF COMING MEETINGS OF DENVER SECTION

A tentative program has been made for coming meetings of the Denver Tramway Company Section as follows:

December meeting: F. W. Hild, general manager of the company, will speak on scientific management or an allied subject, the title to be announced shortly.

January meeting: H. C. Fligg, in charge of the coasting department, will speak on "Schedules, Skip-stop and Express Service."

February meeting: A member of the Colorado State Public Utilities Commission will address the section on a subject to be announced.

FIRST YANKEE COMPANY SECTION FORMED

At an enthusiastic dinner gathering held in the Garde Hotel, New Haven, Conn., on Tuesday evening, Dec. 7, 1915, a company section of the association was formed by 150 employees of the Connecticut Company. The list of speakers included Martin Schreiber, Newark, N. J., chairman of the committee on company sections and individual membership; C. C. Peirce, Boston, Mass., vice-president of the Manufacturers' Association; E. B. Burritt and H. C. Clark, New York, N. Y., respectively secretary of the association and editor of its magazine, and L. S. Storrs and J. K. Punderford, New Haven, Conn., respectively president and general manager of the company. A. C. Flickinger presided at the dinner.

Mr. Burritt told of the work of the association as it relates to the company section movement. Mr. Schreiber enlarged on the benefits of the company section to all concerned, basing his statements partly upon his experience in the Public Service section. Mr. Peirce gave reminiscences of the early days of the companies which later united to form the Connecticut Company, with which he had been personally familiar. Mr. Clark told of the relation of *Aera* to the sections. Messrs. Storrs and Punderford indorsed the movement in their official capacities and extended their best wishes.

The section is the outgrowth of a bowling club which recognized the advantages of organization. A committee, comprising Harold Bates, assistant engineer, as chairman, and I. A. May, comptroller, made a special study of the matter, visiting the section in Newark to examine at first hand the results of the work. Their report was so favorable that the plan went through with a rush. Details of the organization will be given in a later issue.

CHICAGO ELEVATED SECTION

Reports from the specially-favored members of the Chicago Elevated Railroad section made up the principal part of the program of the meeting held Dec. 1. One hundred and ten members and guests were in attendance, and President Johnson presided. Secretary Smith's report showed that thirty-five new members had been added to the section, making 156 in all. He also read a letter from Charles L. Henry, president of the American Electric Railway Association, in which Mr. Henry expressed assurance of his support and cooperation. C. E. Shaw, division foreman of signals and interlocking, and A. H. Daus, assistant master mechanic, the delegates of the section to the San Francisco convention, reported concerning their trip. Mr. Daus illustrated his talk with a number of photographs which he had taken en route and mounted on lantern slides. J. A. Jarvis, division superintendent and one of three employees who were sent by the company to the military training camp at Fort Sheridan, Ill., told of his experiences there.

NOTES ON THE MANUFACTURERS' ASSOCIATION

The membership in the Manufacturers' Association, although somewhat less than last year, compares very favorably with that during other years when the convention has been held at points other than Atlantic City. At the meeting of the executive committee on Nov. 12, Secretary McConnaughy reported that the total membership at that time was 299, as compared with 359 in 1912 when the convention was held in Chicago, with 274 in 1909 when it was held in Denver, and with 274 in 1906 when it was held in Columbus. At the same meeting Mr. Finigan, who was vice-president in charge of entertainment at the San Francisco convention, stated that the actual expenses for carrying out the entertainment program were $1,725. The treasurer presented a financial report showing a balance in the bank on Nov. 12 of $8,904, and a dinner committee to take charge of the arrangements for the banquet at the time of the mid-year meeting in Chicago was appointed. This committee consists of Charles C. Peirce, L. E. Gould, Miles B. Lambert and E. F. Wickwire.

Annual Meeting of A. S. M. E.

The winter meeting of the American Society of Mechanical Engineers was held in New York from Dec. 7 to 10, with a registered attendance of 1210. An announcement of this meeting with a list of some of the papers of electric railway interest appeared in last week's issue of the ELECTRIC RAILWAY JOURNAL, page 1140. Abstracts of several of the papers will be printed in a later issue.

Among the features of this meeting, aside from the discussion of engineering topics, was a stirring address by the retiring president, Dr. John A. Brashear, a memorial meeting to the late Dr. Frederick W. Taylor, the father of scientific shop management, conferences of delegates from the society's fourteen local sections throughout the country, excursions to various points of engineering interest, and special social functions.

The officers elected for the coming year are as follows: President, Dr. D. S. Jacobus, Hoboken, N. J.; vice-presidents, George W. Dickie, San Francisco, Cal.; Henry Hess, Philadelphia, Pa.; James E. Sague, Poughkeepsie, N. Y.; W. B. Jackson, Chicago, Ill.; J. Sellers Bancroft, Philadelphia, Pa., and Julian Kennedy, Pittsburgh, Pa.; managers, A. M. Greene, Jr., Troy, N. Y.; John Hunter, St. Louis, Mo.; Elliott H. Whitlock, Cleveland, Ohio; Charles T. Main, Boston, Mass.; Spencer Miller, New York, N. Y.; Max Toltz, St. Paul, Minn.; John H. Barr, New York, N. Y.; J. A. Stevens, Lowell, Mass., and H. De B. Parsons, New York, N. Y.; treasurer, William H. Wiley, New York, N. Y.; secretary, Calvin W. Rice, New York, N. Y.

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

Rail Bond Testing—II—Determining and Interpreting Bond Resistance

BY H. H. FEBREY, ENGINEER AMERICAN STEEL & WIRE COMPANY, FORMERLY ASSISTANT ENGINEER PENNSYLVANIA TUNNEL & TERMINAL RAILWAY

In the issue of the ELECTRIC RAILWAY JOURNAL for Dec. 4, page 1130, the writer outlined the principal means used for testing bond resistance. This second and concluding article is taken up with the practical application of the data derived from tests in the field and in the laboratory.

The true resistance of rail bonds, including contact resistance, has been carefully determined, and sufficient data are available for determining the resistance of almost any bond. Table I is convenient for determining the ohmic resistance of bonds of several sizes. The contact resistances are included.

In Table I the third column shows the resistances of complete joints made with 10-in. bonds, the fourth column giving the approximate resistance of the joints in a mile of rail. The last two columns are added for convenience in determining the resistances of single joints and of joints per mile of rail with other than 10-in. bonds. The fifth column gives the resistance per inch of bond. Obviously the resistance of a joint with a longer or shorter bond is as much greater or less than that of one with a 10-in. bond by the product of the difference in bond length in inches and the resistance per inch. The last column is the corresponding difference per mile of rail. The contact resistances are for 9/16-in. rail webs, but for all practical purposes in testing this is sufficiently close.

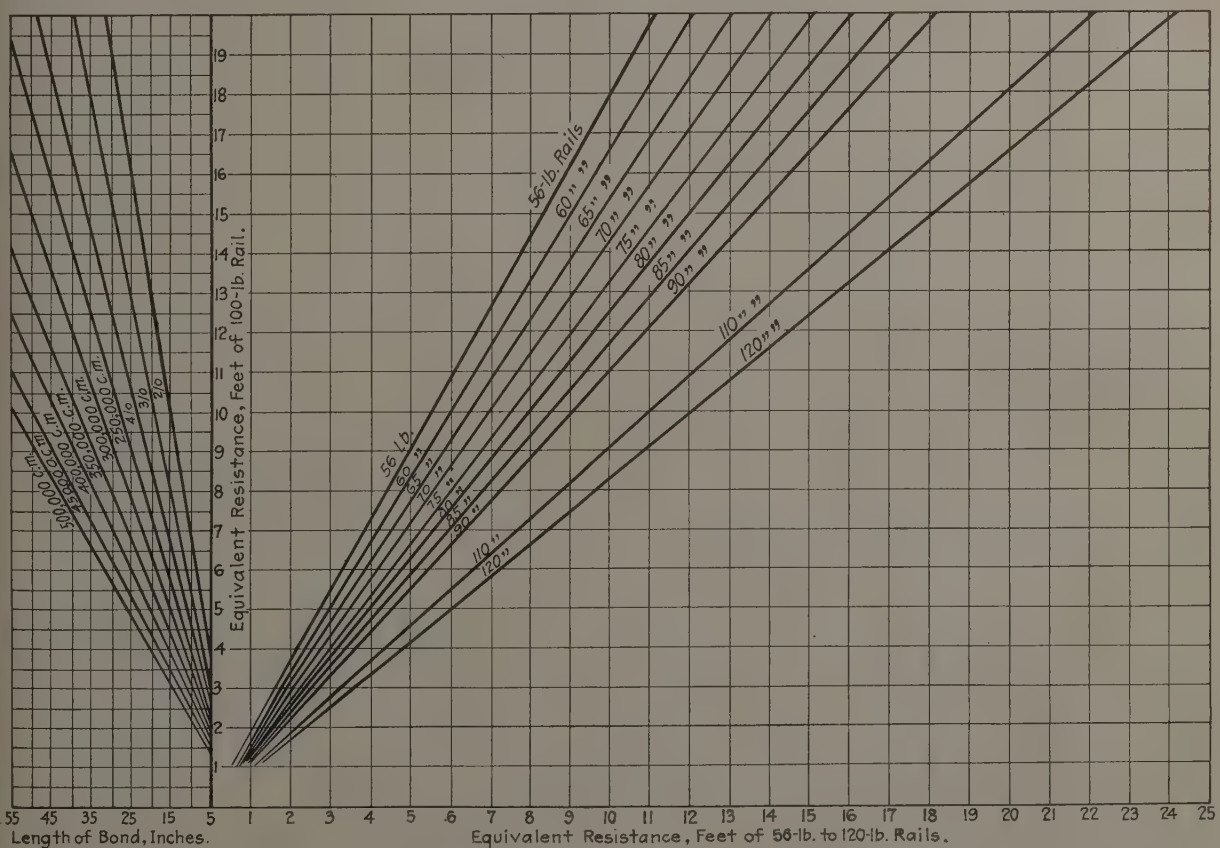
TABLE I—RESISTANCE OF BONDED JOINTS AT 68 DEG. F.*

Size of bond	Diameter of stud terminal, in.	Resistance of joint bonded with 10-in. formed-stud terminal bond, ohm	Total resistance of 170 joints bonded with 10-in. bonds, ohm	Resistance per inch of duplex par. bond conductors	Total resistance of 170 in. of bond conductors
0	½	0.00008271	0.0140607	0.00000792	0.001346
00	⅝	0.00006957	0.0118269	0.000006435	0.001094
000	⅝	0.00005343	0.0090831	0.00000518	0.000881
0000	⅞	0.00004553	0.0077401	0.00000410	0.000697
300,000 circ. mil	1	0.00003443	0.0058531	0.00000292	0.000496
500,000 circ. mil	1	0.00002200	0.0037400	0.000001782	0.000309

*This and the following tables are reproduced by permission, from the A. S. & W. Co. Catalog No. 3.

TABLE II—ACTUAL CONTACT RESISTANCE OF STUD TERMINALS UNDER A CONTACT PRESSURE OF 15 TONS PER SQUARE INCH

Diameter of terminal stud, inch	Area of contact, square inches	Contact resistance, ohm
1	1.77	0.00000040
⅞	1.55	0.00000045
¾	1.33	0.00000053
⅝	1.10	0.00000064
½	0.88	0.00000080
Two twin-terminal studs	2.00	0.00000035



BOND RESISTANCE—FIG. 1—CHART FOR DETERMINING LENGTH OF RAIL EQUIVALENT TO A COPPER BOND

Table III—Area of Copper, in Circular Mils, Equivalent to Railway Steel in Conductance

Weight of rail, pound per yard	Actual area: Square inches	Actual area: Circular mils	Copper Equivalent, Circular mils*
50	4.90	6,238,800	519,900
60	5.88	7,486,600	623,883
70	6.86	8,734,400	727,866
80	7.84	9,982,100	831,841
90	8.82	11,229,900	935,825
100	9.80	12,477,700	1,039,812
110	10.78	13,725,400	1,143,783
120	11.76	14,973,200	1,247,766

*Based on a conductivity ratio of 12:1.

Table IV—Resistance of Continuous Steel Rails at 68 Deg. F. (No Joints)

Weight of rail, pound per yard	Resistance, ohm*: Per 1000 feet	Resistance, ohm*: Per mile
50	0.019925	0.105204
60	0.016606	0.087680
70	0.014233	0.075152
80	0.012454	0.065757
90	0.011070	0.058449
100	0.009963	0.052604
110	0.009057	0.047821
120	0.008303	0.043839

*Based on a conductivity ratio of copper to steel of 12:1.

In Table II are given the contact resistances of terminals of various diameters under a contact pressure of 15 tons per square inch, together with the contact areas in 9/16-in. rail webs. The figures are for single terminals. Table III shows the areas of copper in circular mils equivalent in conductivity to railway steel. Table IV contains the resistance in ohms of continuous steel rails.

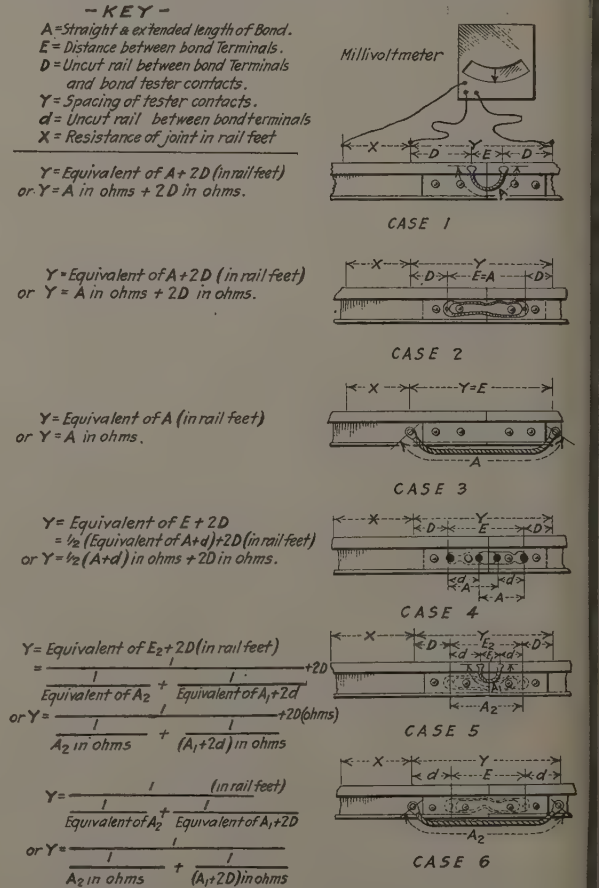
The diagram given in Fig. 1 will be found convenient in determining quickly the length of rail of several sizes equivalent to given lengths of bonds of several sizes. To use the chart, begin at the lower left-hand corner and follow the vertical line corresponding to the length of bond selected until this line intersects the diagonal line corresponding to the selected cross-section of bond. Then follow a horizontal line from this intersection to the right to its intersection with the diagonal line corresponding with the selected size of rail. Directly below this intersection, on the right-hand horizontal scale, is the length of rail having the same resistance as the selected bond. For convenience in reading the lengths of 100-lb. rail corresponding to the several bonds the vertical scale has been shown in this diagram.

Owing to the variation in the lengths of rail bonds it is seldom that the resistances found from tests are exactly as derived from the tables and charts. The bond terminal contacts may be anywhere from 3½ in. to 4 ft. or more apart, whereas the tester contacts are commonly at a fixed distance apart. In the comparative methods it is essential that the center tester contact be outside of the bond terminals. It is obvious that there is a division of the current at the bond terminals, a small part of it flowing through the splice bars and the remainder through the bonds. The uncut rail between the bond terminal and the rail end will contain a smaller current than that outside of the bond terminals and should never be used for comparison, unless correction is made for this. It will eliminate the necessity for corrections if the tester contacts are arranged to coincide with or exceed the spacing of the bond terminals and to consider the results of the test on the basis of so many feet of joint.

The diagrams given in Fig. 2 illustrate how to obtain the proper resistance of the bonded joints as tested. The distance Y is commonly taken as 3 ft. This is convenient for roads where both long and short bonds are used. It is apparent that 3 ft. of joint has different resistances in the figures. The capacity of the bond, number of bonds, and length and distance between bond terminals must be taken into account. As a general rule no consideration is given to the splice bars as paralleling the bond as far as resistance is concerned. The resistance of their contact with the rails is generally very high.

The efficiency of installed rail bonds cannot be clearly defined on account of the joint conditions, which preclude a relative consideration of the perfectly bonded joint. The splice bars undoubtedly reduce the joint resistance to some extent, sometimes by a very appreciable amount but more often by a negligible amount. Furthermore the bond conductors may be broken, thereby reducing the capacity, and the solid rail to which the joint is compared may be worn to reduced section, or the rail may be of different ratio of resistance to copper than the mean value of 12 to 1.

The contact resistance is a very small quantity when the installation is perfect, and a newly applied bond will not develop higher than calculated resistance except at the terminals. Experiments have shown that a contact pressure of 25,000 lb. per square inch is necessary in order to obtain an air-tight connection. There is therefore little room for increase in the total resistance of newly installed bonds, and the practice of testing bonds immediately after installation should be extended. The argument often advanced to the effect that it is necessary for a bond to be exposed to the elements for a time in order to determine faulty installation, is to some degree a fallacy. The effect of the splice bars may offset the resistance of the terminal contacts, thereby causing an improperly installed bond to appear good, but this is unavoidable. It will more often be found that the splice bars are of too high resistance to influence the test. The purpose of the test is to locate the poorly-applied bonds, and if the test develops a resistance greater than the calculated value it seems reasonable to assume that the resistance must lie in the terminal contacts of a new bond. If the de-


-KEY-
A=Straight & extended length of Bond.
E=Distance between bond Terminals.
D=Uncut rail between bond Terminals and bond tester contacts.
Y=Spacing of tester contacts.
d=Uncut rail between bond terminals
X=Resistance of joint in rail feet
Millivoltmeter
Y=Equivalent of A+2D (in rail feet) or Y=A in ohms + 2D in ohms.
CASE 1
Y=Equivalent of A+2D (in rail feet) or Y=A in ohms + 2D in ohms.
CASE 2
Y=Equivalent of A (in rail feet) or Y=A in ohms.
CASE 3
Y=Equivalent of E+2D = ½(Equivalent of A+d)+2D(in rail feet) or Y=½(A+d) in ohms + 2D in ohms.
CASE 4
Y=Equivalent of E2+2D(in rail feet) = 1/(1/Equivalent of A2 + 1/Equivalent of A1+2d) +2D or Y= 1/(1/A2 in ohms + 1/(A1+2d) in ohms) +2D(ohms)
CASE 5
Y= 1/(1/Equivalent of A2 + 1/Equivalent of A1+2D) (in rail feet) or Y= 1/(1/A2 in ohms + 1/(A1+2D) in ohms)
CASE 6

BOND RESISTANCE—FIG. 2—FORMULAS FOR CALCULATING RAIL JOINT RESISTANCE

fects in the bonds are corrected immediately the bonds may maintain contact indefinitely.

Bonds which have been installed for a period may be given different consideration. If they are concealed it is possible that the bond conductors may be broken or the terminals may have been loosened by interference with the splice bars. The bonds are therefore subject to deterioration from causes which affect the entire bond and under the circumstances they are entitled to a direct comparison between the perfect bond resistance and the resistance of the entire bond when tested. If the joint, as tested, should measure as equivalent to 6 ft. of rail and the perfect joint was equivalent to 4 ft., the relative efficiency would be 66.6 per cent. To say at what efficiency old bonds should be replaced is impracticable for the reasons already given. Local conditions will govern this. Newly installed bonds, however, should test not to exceed 6 in. more than the calculated resistance.

Another point for consideration is the case where rebonding is done with the old bonds in place. When the new bond is applied to a bonded joint a parallel resistance condition is interposed. The resistance of the old bond should be noted and figured as in parallel with that of the perfect new bond in order to determine what the resistance of the rebonded joint should be.

Frequently joints which are bonded with concealed bonds in paved streets are rebonded by placing bonds around the splice bars. In other instances concealed bonds are bonded over with short bonds attached to the head of the rail.

To take a concrete case, assume a 70-lb. T-rail to be bonded with one 10-in. No. 0000 bond and that a test of 3 ft. across the joint shows it to be equivalent to 14 ft. of rail. This is illustrated by Case 2, Fig. 2. The equivalent of A is (14 ft. 0 in.) — (2 ft. 2 in.), or 11 ft. 10 in. If we add a No. 0000, 8-in. twin-terminal bond to the same joint we have the same condition as in Case 5, where $E_1 = 4$ in. and $2d = 6$ in. Using the equation for equivalent of Y in rail-feet we find that the resistance will be reduced to that of 4 ft. 7 in. by the addition of the twin-terminal bond.

If we had considered the resistance of the twin-terminal bond alone, as in Case 1, the equivalent of 3 ft. of joint would have been 2 ft. 7 in. + 2 ft. 8 in. = 5 ft. 3 in., instead of 4 ft. 7 in., or an error of 8 in.

The difference will be found to be much greater when a long bond is placed around a high-resistance, concealed bond as in Case 6. Assuming that the rail and concealed bond are the same as in the previous case, we find that the resistance of the joint, when rebonded with a 37½-in. No. 0000 bond, is equivalent to 6 ft. 11 in., as against 13 ft. 7 in. for a single long bond.

It will be seen, therefore, that the higher-resistance bonds, say 20 ft. and more in length, will have practically negligible effect on the resistance of joints with short new bonds, but where long bonds are being placed around a joint the resistance of the joints before rebonding is of appreciable importance.

While it is undoubtedly more accurate to determine first the resistance of any joint before bonding in order to obtain the actual resistance of the new bond, it is not often practical to do this, nor is such a procedure warranted where the paralleling effect of the splice bars only is of concern. If many joints test better than perfect, so much the better for the return circuit. The higher-resistance bonds are the ones to be located and replaced.

The various laboratory tests which have been made to determine the actual resistances of carefully installed bonds differ somewhat. That there is a slight, and in some instances inconsistent, variation in the figures given in different sources of information is probably due to differences in the locating of testing instrument contacts. The personal element and the inequality of testing facilities also contribute in part. In the case of the terminal-contact resistance alone the variations are more marked. Values given for the same diameter terminal in the same thickness of rail web vary anywhere from three to fifteen times the values given herein. Although the maximum difference is less than 0.01 microhm, a variation of 1500 per cent does not seem reasonable.

The contact resistance cannot be measured directly because it is the resistance of an infinitesimal space. The values given herein were obtained by careful tests on plane surfaces in which the minimum resistance per square inch of surface was determined. With this as a unit the actual contact resistances were calculated.

In conclusion, attention is called to the somewhat general complaint that bonds gradually increase in resistance. This may be due to the elimination of the paralleling of the splice bars on account of wear and rust.

Brush Tests on Non-Interpole Motors with Slotted Commutators

BY KEITH MACLEOD, MONTREAL TRAMWAYS

For the purpose of comparison with the results of tests described in an article printed in the issue of the ELECTRIC RAILWAY JOURNAL for Aug. 22, 1914, page 355, the following results recently completed on brushes used on non-interpole motors with slotted commutators are given. These results show the effects of the practice of commutator slotting under the conditions obtaining on the Montreal Tramways.

The recent tests were conducted in substantially the same manner as those previously described, and both sets of tests were made for the purpose of selecting the most economical brush.

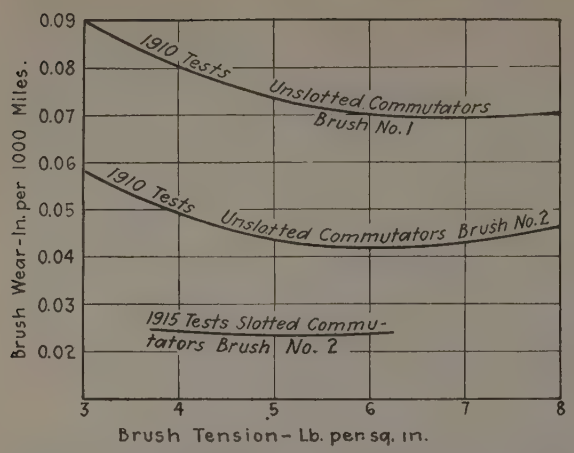
When the practice of slotting commutators was started it was noted that the percentage of broken brushes was increasing, and it was primarily to find out if a brush could be selected to stand up under the new conditions that the latest tests were started. It was noted that the old standard brush had no injurious effect on the slotted commutator, which was rather remarkable as this was a brush designed especially for commutators with flush mica. Accordingly this brush was included in the tests, making a total of four types of brush tested.

Each of these, with the exception of No. 2, was the brush recommended by one of three brush manufacturers for non-interpole motors, with slotted commutators, in city service. Data as to brush resistance were not available for, as the manufacturers' representatives pointed out, resistance measurements of carbon have to be made under identical conditions to give results of value. However, considerable mechanical data were obtained. Leaving out No. 2, an abrasive brush not particularly recommended for the tests, these were as given below.

The relative hardnesses, or resistances to scratching with a knife, were as follows: No. 4, softest; No. 5, hardest.

The breaking strengths, as determined by supporting the brushes on round bars placed 1½ in. apart, applying a breaking load at the middle by means of a round iron bar, and calculating the stress by the usual beam formula, were as follows: No. 4, 1020 lb. per square inch; No. 3, 1920 lb. per square in, and No. 5, 2380 lb. per square inch.

A motor that experience had shown to be typical of



VARIATION IN BRUSH WEAR WITH BRUSH TENSION IN NON-INTERPOLE MOTORS

the non-interpole motors on the road was chosen for the test, and seventeen regular cars equipped with this type of motor were fitted with the test brushes.

Brushes of each type were distributed in various ways among the motors on each car, and each brush was marked with the car number and its position in the car. Thus "1300-2-R-0" would indicate that the brush was on car No. 1300, on No. 2 motor of this car, and in the rear brush-holder. It was also the outside brush. Each brush remained in the same position throughout the test.

Beyond instructions to workmen to report to the foreman any cases of marked brushes needing replacement, and an occasional inspection by the foreman, no particular attention was paid to the brushes under test. The tests were continued for about a year, variation in conditions due to change in weather being thus taken care of.

The results of the tests are shown in Tables I and II.

The results of the test show conclusively that the brushes formerly used as standard on unslotted commutators are not well suited for operation on slotted commutators. There is no great difference in the average rate of wear of the different types, and the rate of wear is practically uniform.

The greatest differences among brushes were in their ability to resist chipping and breaking. While it would seem at first sight that the toughest brush would produce the most wear on the commutator, this proved not to be the case, the wear of the commutators with all types of brush being entirely negligible.

The effect of variation in brush tension on wear was not very marked, the tension being varied between 3½ lb. and 6 lb. per square inch to determine this point.

Comparing the results of the later tests with those of the former ones the following appeared to be the most noticeable differences due to the practice of slotting the commutators:

The rate of wear of brushes of the same type is largely reduced, but chipping and breaking of brushes may increase. This might not be so noticeable in double-ended cars, as the tendency to sharpen the edges of the brushes would not be so great as on cars running continuously in one direction. The chipping can be minimized by selecting the proper type of brush.

The wear of commutators is reduced to an almost negligible quantity.

The effect of brush tension on brush wear is not nearly so marked as with unslotted commutators. This may be due to the fact that where the mica is not undercut it does not long remain exactly flush with the copper, and thus creates a condition favorable to arcing and rapid wear. The fact that there is less effect on wear due to variation in brush tension with slotted commutators should, however, not be made an excuse for slackness in maintaining the tension at its correct value.

It has been noted that unless the undercutting has been very carefully done and each slot gone over by hand to thoroughly remove all mica, the advantages of slotting are considerably diminished. On the other hand the resulting economy fully justifies the best possible workmanship in this operation.

In connection with this matter of selecting the most economical brush it is necessary to keep in mind the quantities which are involved in brush cost. These are: The cost due to the actual wear of the brush; the cost due to the replacing of brushes before they are worn out for any reason, and the cost due to the wear of the commutator.

The wear of brushes may be considered as made up of two components, electrical wear and mechanical wear. The electrical wear is the disintegration that results from the slight arcing under the brushes, which is noticeable in non-interpole motors, especially those with unslotted commutators. This wear is much aggravated by unevenness of the commutator surface or by excessive vibration of the motor as a whole, caused by excessive stiffness in suspension, poor fitting of gears and pinions, roughness of track, etc. The mechanical wear is due to friction between brush and commutator; which depends to a large extent on the condition of the surface of the latter. It is in the reduction of mechanical wear that the advantage of a brush which produces a burnished commutator appears.

Brush tension in general has contrary effects on the electrical and mechanical wear of brushes. Obviously, the less the tension the less the brush wear if no current is passing. On the other hand, low tension encourages bad sparking with deterioration of brush and commutator surface. In non-interpole motors with unslotted commutators the two effects are quite marked, and there appears to be a tension at which the combination of the two rates of wear is a minimum.

On the accompanying curves are shown the effects of brush tension on the wear of the two types of brush. The most economical tension is about the same for both, notwithstanding the wide difference in the actual rate of wear.

Commutator wear is influenced to a large extent by the type of brush used. On unslotted commutators the necessary abrasive for cutting the mica may not be correctly proportioned, with the result that high mica and consequent burning of the copper produce rapid wear. The effect on the commutator wear of varying

TABLE I—RESULTS OF BRUSH TESTS ON NON-INTERPOLE MOTORS WITH SLOTTED COMMUTATORS

Type of brush, number	2*	3	4	5
Number tested	91	75	74	77
Per cent chipped and broken	29.7	18.7	20.3	6.5
Wear per 1000 miles, inch	0.025	0.023	0.033	0.024
Normal life, miles	35,000	38,000	26,500	36,500
Cost per motor per 1000 miles, cents	1.26	1.05	3.82	1.00
Cost per motor per 1000 miles allowing one-half normal life for broken and chipped brushes, cents	1.64	1.25	4.60	1.07

*This brush was formerly standard on unslotted commutators.

TABLE II—RATES OF WEAR FOR DIFFERENT PERIODS OF TEST

	FIRST PERIOD		SECOND PERIOD		ENTIRE TEST	
Type of Brush, Number	Total Miles	Wear per 1000 Miles, Inch	Total Miles	Wear per 1000 Miles, Inch	Total Miles	Wear per 1000 Miles, Inch
2	917,840	0.025	1,062,650	0.026	1,980,490	0.025
3	879,920	0.025	1,033,510	0.021	1,913,430	0.023
4	879,920	0.034	607,100	0.033	1,487,020	0.03'
5	917,840	0.028	860,350	0.020	1,778,190	0.024

the brush tension is not so marked as it is in the case of brush wear, but the general tendency is the same.

The item of cost resulting from the brushes not reaching their full life depends not only upon the tendency of brushes to chip and break, but also on the efficiency of the carhouse force in keeping the brush-holders and springs in good condition and in seeing that worn brushes reach their minimum length before they are replaced. Aside from the carhouse conditions, which are independent of the type of brush, there is always a percentage of the brushes that break up or are so badly chipped as to be unfit for service before they wear out.

It is difficult to fix an average service which these brushes should give before they have to be replaced, but in comparing types of brush it will usually be within the limits of error to assume the average for all chipped and broken brushes to be equal to about half the normal life. This was done in calculating the cost shown in Table I.

That the three items of cost discussed are worth considering is shown clearly by the data given in Table III, which are taken from the results of the test referred to.

TABLE III—RESULTS OF TESTS OF BRUSHES ON NON-INTERPOLE MOTORS WITH UNSLOTTED COMMUTATORS

Type of brush, number	2	1
Number tested	32	32
Per cent chipped and broken	21	40
Cost per motor per 1000 miles due to brush wear only, cents	2.03	1.15
Cost per 1000 miles due to brush wear, allowing broken and chipped brushes one-half normal life, cents	2.46	1.61
Cost per 1000 miles due to wear of commutator, cents	2.60	5.48
Total cost per motor per 1000 miles, cents	5.06	7.09

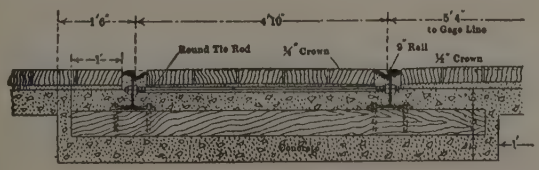
NOTE.—No. 1 was a cheaper brush and "brush wear only" cost less in spite of greater wear.

These tests were made more than five years ago to find a brush which would reduce brush costs, these being excessive at the time. As a result of the tests No. 2 was selected and remained standard until the practice of slotting was adopted. As shown in the table, the costs due to brush wear and chipping were favorable to the previous standard, No. 1, and it was only when commutator cost was included that the great advantage of the more expensive brush, No. 2, appeared. That this selection was justified was proved by large reductions in costs, the lower figures obtaining until slotting was started, when they began to rise on account of abnormal chipping.

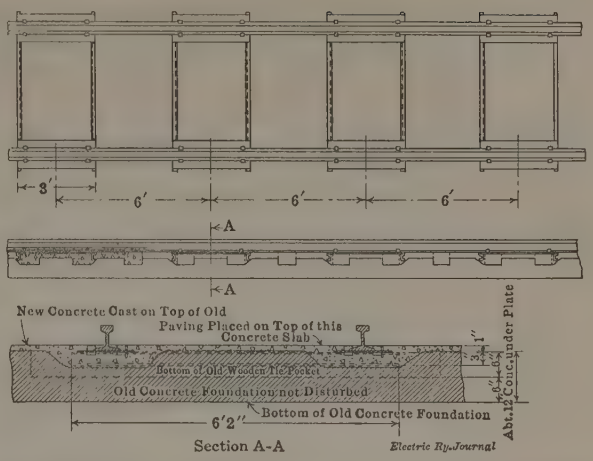
Steel Twin Ties for Concrete Track Rehabilitation

One of the interesting and valuable possibilities of twin steel ties of the International Steel Company, Cleveland, Ohio, lies in its application to rehabilitated concrete track. A certain railway which has been using a 9-in. girder rail wished to replace it with a 6-in. T-rail. To do this in the ordinary way, the company would have found it necessary to break up and remove the wooden ties and a 7-in. concrete base. This, of course, would have been very costly and slow.

The engineer of the property conceived the idea that by using twin steel ties which are only 3-in. deep he could build up the new track of 6-in. T without disturbing the concrete base of the original wooden ties.



CROSS-SECTION OF ORIGINAL FOUNDATION WITH WOODEN TIES AND 9-IN. GIRDER RAIL



FOUNDATION AS ALTERED TO TAKE NEW T-RAIL ON TWIN STEEL TIES

These ties, by the way, had been creosoted and were in excellent condition, except for mechanical damage due to the character of their fastenings. Thus the application of the shallow but strong-bearing International twin tie will solve the most important rehabilitation problem that has arisen from the use of concrete foundations. The cost of the ties is actually less than would be the cost of removing the old concrete alone. The cost of new concrete is also eliminated and disturbance to traffic is avoided to a very large degree.

Contactor Signals Operate at Low Voltage

Automatic signals operated from a trolley potential varying from 200 to 600 volts represents a most severe test, but signals installed on a certain section of the Louisville (Ky.) & Interurban Railway have met this condition and have given no trouble whatever from this source. The Louisville & Interurban Railway operates an interurban line to Jeffersontown, 12.5 miles from the Louisville terminal station. This line is double track through the city and 5.2 miles out, and then continues as single track with passing sidings to Jeffersontown. The line is fed from a power house 1.5 miles from the terminal station, consequently there is a large line drop near the Jeffersontown terminal, at times momentarily as much as 400 volts. When traffic is heavy the drop is too great and a substation 2.6 miles from Jeffersontown is put into service. As a rule, however, the traffic is rather light, except on Sundays and holidays and at county fair times, and ordinarily does not warrant the operation of this substation. Cars are operated on a one-hour headway, but on Sundays and holidays, as mentioned, a half-hourly headway is maintained and alternate trains have two cars.

CONTACTORS AND SIGNAL ON LOUISVILLE & INTERURBAN RAILWAY

About three-quarters of a mile from Jeffersontown the line passes under the Southern Railway, threading through a cut where the view is obstructed. To protect this block Nachod automatic signals, Type CD, have been installed at the two sidings, a half mile apart. These permit following movements through the block but prohibit opposing ones. At these points the wide variation in voltage obtains at certain periods without affecting the operation of the signals. It is, of course, possible to compensate partly for varying line voltages by proper use of the car controller, but the signal remains with a fixed resistance for all line voltages. Although the signal relays are operated by direct-acting, long-stroke plunger magnets, provision for this wide range of operating voltage is made by oil-cooling the relay coils and by using resistances which are shunted out of circuit before the magnets operate.

The trolley contactors at one of the sidings are shown in one of the accompanying illustrations. They are placed outside of the turnout on the single track, two being necessary in the double-trolley construction. These contactors are suspended from one end only, on a double curve pull-off, thus being free from line stresses. They are placed with respect to the bracket, so that the contactor will have been traversed by the wheel and contact made before the wheel strikes the suspension. In this way the contacting has been done before the wheel receives the slight shock due to the cusp in the wire at the suspension. In another one of the accompanying illustrations the signal at the other end of the block is shown. This is supported on an iron bracket through-bolted to the pole, from which it may easily be lifted and lowered to the ground with connections intact. To make this possible the vertical pole wiring is in a cable made by taping the separate rubber covered wires and tying the cable to cleats as a single wire. This bracket offsets the signal from the pole so that it is plainly visible to approaching cars. A locked fuse box is also provided at man height on the pole in order to isolate the circuits and arrange for easy disconnection, tests and fusing.

Both signals are normally dark, but a west-bound car accepting the "neutral" signal at one siding and passing under the trolley contactor sets the opposing signal at the other siding at stop—a red light and red disk. The signal, in advance of the west-bound car changes to permissive—a white light and white disk, which indicates full protection through the block. A following car may accept this permissive signal and will be counted in on the signal relay, a situation which is indicated by the blinking of the white light. Not until both cars have left the block would the signals again be restored to normal.

The trolley contactors, shown in the illustration, are of the wiping type and receive the wheel very smoothly, operating on some lines at the very high speed of 71 m.p.h. Since these contactors have no moving parts they are directional. A car passing under a contactor toward the signal will set both signals as described, but backing out again under the same contactor will clear them.

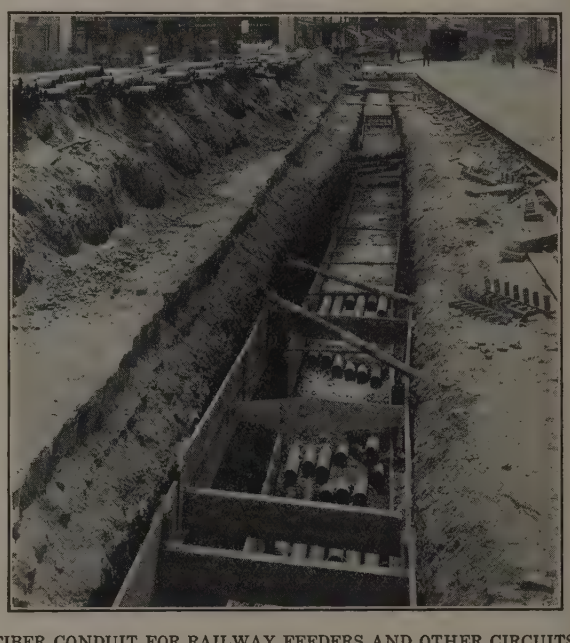
Should the signal be indicating "permissive," the entrance of the car into the block will merely cause a movement of the counter one notch forward and one reverse, leaving it in its original position. Should a car over-run the contactor with the signal indicating "stop," the signal aspects will not change although a count will be recorded. If the car backs out again the indications of the signal will not have been changed. The operation of the signal is normal even though the car might have the trolley wheel on the wrong wire for that direction. The control is thus extremely flexible, the signals showing at all times whether the block is clear or occupied, and if occupied, which way the cars are moving in the block.

Motormen are instructed to throw off power while passing contactors to reduce line drop at that time. These signals are both operated and lighted by the trolley voltage, no changes whatever in the track being necessary. The signal lights are 60-watt tungsten lamps and the disks enameled aluminum, moving parallel to a glass roundel. This combination of lights and disks gives unmistakable indications under the worst conditions of bright sunlight and low voltage.

Fiber Duct Conduit at Worcester

In the issue of the Electric Railway Journal for Aug. 21, 1915, reference was made to the installation of fiber ducts for feeders by the Worcester Consolidated Street Railway coincident with double-tracking. In this connection the accompanying illustration and other particulars will be of interest.

The new Worcester feeder conduit consists of thirty or thirty-six 3½-in. Orangeburg fiber ducts of the



FIBER CONDUIT FOR RAILWAY FEEDERS AND OTHER CIRCUITS AT WORCESTER, MASS.

Fibre Conduit Company, Orangeburg, N. Y., laid in a trench 5 ft. deep and 30 in. wide at the bottom. They contain both positive and negative feeders, and provide rental space also. The special manholes used are of an offset type with entrances 30 in. in diameter located at one side of the track. The working chamber, brick-lined at the sides, with an 8-in. concrete base and concrete, brick and steel roof, is 8 ft. long and 5 ft. wide, the height being 7 ft. 6 in. At one side is a step 3 ft. high and 2 ft. 9 in. wide below the entrance, which was required by the city to facilitate the location of future underground structures. The negative feeders are carried from duct to duct along the roof, the other cables being racked on the wall in the usual way. Thirteen bull rings, attached to walls and floor, provide means for the handling of cable from the street into the ducts by snatch blocks and pulleys.

News of Electric Railways

TORONTO RAPID TRANSIT REPORT PRESENTED

Engineering Commission Proposes System of Rapid Transit and Radial Railway Entrances to Cost $18,817,000

The report on a system of rapid transit and radial railway entrances proposed by Mayor Church of Toronto, Ont., in his inaugural address to the City Council was presented to the city on Dec. 7 by R. C. Harris, Commissioner of Works; F. A. Gaby, chief engineer of the Hydro-Electric Power Commission of Ontario, and E. L. Cousins, chief engineer of the Toronto Harbor Commission, who was in actual charge of the preparation of the report. The system of radial entrances, terminals and yards as proposed by the engineering commission will cost $18,817,000 divided as follows: west line, from terminal to west focal point, 5.2 miles, $4,076,000; east line, from terminal to east focal point, Coxwell and Danforth Avenue, 4.7 miles, $3,120,000; north line, Queen Street to north focal point, Duplex Avenue and Belt line, 3.2 miles, $7,696,000; east and west yards and freight facilities, $1,365,000; terminal station at the foot of Yonge Street and carhouse, $2,560,000. The conclusions of the engineering commission are in effect as follows: the existing surface railway system within the old city limits, provided with more cars, improved equipment, and operated at a higher efficiency, will adequately serve the city within the limits of 1891. The present radials entering the city cannot be considered rapid transit lines. The most feasible entrances for such a system lie along the water front. The entrance from the north may be easily effected by subway construction.

The report states that aside from operating considerations, the additional cost of $8,000,000, embracing a four-track subway from the water front to College Street, and the erection of a terminal at the latter point, make an uptown terminal unfeasible. The terminal should be at the axis on the water front. Provision should be made for the co-ordination of rail and water traffic. The radial railway trunk lines should, as the future demands, and the city extends, provide for the operation of semi-rapid transit lines.

The commission recommends in effect as follows:

The acquisition by the city of the Toronto Railway system in 1921. The establishment of a transportation commission, with representatives from the ctiy, the Harbor Commission, and the Provincial Hydro-Electric Power Commission, so constituted as to give the city a majority. The construction of three trunk radial entrance lines, with necessary yards and terminals. Until 1921 the radial railways should be restricted to the use of the water-front terminal. The future will demonstrate the advisability of a down-town loop operated initially as a surface line, pending the time traffic warrants other construction.

The engineers say that the construction of a rapid transit system in the strict meaning of the term is not justified in the city. They recommend that the radial railway trunk line entrances be used for a semi-rapid transit system. The policy should be declared at once, and immediate steps taken for acquiring the Toronto Railway in 1921. The reduction of the present gage of the rails to the standard gage is recommended. Present traffic conditions, the engineers point out, could be improved by rerouteing. It is estimated that the city will have a population in 1927 of 750,000, in 1936 of 1,000,000, and in 1950 of 1,500,000. A rapid transit system, the report explains, has never been provided in cities with less than 1,000,000 inhabitants, mainly because the initial cost is so large. In this connection the engineers say:

"Toronto is not in a position to construct a rapid transit system in the strict sense of the term, but may, when conditions demand, institute a semi-rapid transit service by using the radial railway entrance lines. We have developed the radial entrance plan so as to permit of such joint use. By so doing, adequate and rapid service may be furnished that portion of the population living outside of what we have termed the thirty-five-minute zone. We assume that persons who travel from the central area to their abode, or vice versa, in the space of thirty-five minutes do not require more rapid transit."

McCALL REMOVED — OSCAR S. STRAUS APPOINTED

Chairman of New York Commission, First District, Dismissed by Governor on Charges Preferred by Legislative Investigating Committee

Edward E. McCall has been removed as chairman and member of the Public Service Commission of the First District of New York by Governor Whitman. The Governor filed his order of dismissal on Dec. 6, after having had under consideration the plea made in his own behalf by Mr. McCall on Dec. 3. The charge of which the Governor found Mr. McCall guilty is that he violated Section 9 of the public service commissions law, which forbids a commissioner to hold stock in a corporation subject to the supervision of the commission. Chairman McCall held 387 shares of stock of the Kings County Electric Light & Power Company, and his defense was that he transferred this stock to his wife just before he was appointed to the commission. In his opinion Governor Whitman said there was no evidence before him of the transfer except the commissioner's unsupported statement, and that while he had no desire to question the truth of Mr. McCall's statement he "did not believe that a transfer within the meaning of the law ever was made." The Governor dismissed entirely the other charges made against Chairman McCall by the Thompson legislative committee. They comprised six charges and twenty specifications, and have been published previously in the ELECTRIC RAILWAY JOURNAL.

On Dec. 9 the Governor announced the appointment of Oscar S. Straus to succeed Mr. McCall as chairman. A personal reviewing the career of Mr. Straus is published elsewhere in this issue.

Mr. McCall answered the charges before the Governor late on the afternoon of Dec. 3. In his brief of more than 100 printed pages he dealt at length with his ownership of 387 shares of the Kings County Electric Light & Power Company stock. Mr. McCall said he would stand on the records of the commission. He also denied the charge that he had accepted a retainer from and rendered legal services to a corporation seeking to avoid the payment of State taxes. He pointed out that the Governor dismissed this charge against him once before, and that as to the committee's motive for bringing it up again he would not stoop so low even to refer to it.

Mr. McCall was appointed to the commission on Feb. 3, 1913, by Governor Sulzer. He has been in public life since 1902 when he was elected to the Supreme Court. He was an unsuccessful candidate for Mayor of New York City in 1913.

The Thompson committee was appointed by the Legislature last January and empowered to investigate the workings of both Public Service Commissions. The committee in the spring filed charges of neglect of duty and misconduct in office against four of the commissioners for the First District, Mr. McCall, J. Sergeant Cram, G. V. S. Williams and Robert C. Wood, but after a hearing before him, the Governor dismissed the allegations as not sustained. Last summer the committee resumed its investigation of the commission for the First District and the subsequent hearings disclosed Mr. McCall's alleged ownership of stock of the Kings County Electric Light & Power Company. The formal charges against him were filed with the Governor on Nov. 15. The investigation of the commission for the First District has not been finished, and a few days ago Senator George F. Thompson, the chairman of the legislative investigating committee, announced that it would be rushed to completion and the inquiry into the workings of the Public Service Commission for the Second District would be resumed.

LIVE AND LET LIVE PLEA IN LITTLE ROCK

Four proposals, the adoption of which, in the belief of the Little Rock Railway & Electric Company, Little Rock, Ark., would aid materially the growth of Little Rock and increase the usefulness and the value of the street railway property, have been submitted to Mayor Taylor and the

members of the finance and the public utilities committees of the city.

According to D. H. Cantrell, president of the company, the first thing that is necessary in order to insure a complete protection of the company's investment is a proper regulation of the jitneys so as to put them as nearly as possible on the same basis with the street railway company, as common carriers. Second, President Cantrell, in view of all of the facts and the circumstances surrounding the granting of the Merchants Lighting Company's franchise and its injustice to the railway company, and also, in view of the very doubtful liability of the railway for the annual tax of $500, asks that the city abandon any further claim for this tax. Third, President Cantrell asks that an investigation be conducted into the actual cost to the city of Little Rock of its municipal lighting plant, in order to determine the feasibility and desirability of a contract being entered into between the city and the railway, whereby the utility company would supply electricity for the municipality's needs; provided, that the railway could supply current more cheaply than the municipal plant could manufacture it. President Cantrell's fourth proposal is one looking toward the elimination of the provision in the company's present franchise which requires it to sell six tickets for a quarter when the population of Little Rock reaches 100,000.

President Cantrell's communication, directed to Mayor Charles E. Taylor and the members of the finance and of the public utilities committees, is concluded as follows:

"It would not be good policy for the city to seriously hamper and embarrass an institution which is yielding and will yield so much revenue to the city, and will pay so much for improvement of the streets. In other words, it would not be good policy 'to kill the goose that lays the golden egg.' Rather should the city aid and assist the company in all reasonable ways to carry out its obligations to the city."

PRESIDENT ON THE RAILROADS

In his address to Congress President Wilson referred to the railroad problem as follows:

"In the meantime may I make this suggestion? The transportation problem is an exceedingly serious and pressing one in this country. There has from time to time of late been reason to fear that our railroads would not much longer be able to cope with it successfully, as at present equipped and co-ordinated. I suggest that it would be wise to provide for a commission of inquiry to ascertain by a thorough canvass of the whole question whether our laws as at present framed and administered are as serviceable as they might be in the solution of the problem. It is obviously a problem that lies at the very foundation of our efficiency as a people. Such an inquiry ought to draw out every circumstance and opinion worth considering, and we need to know all sides of the matter if we mean to do anything in the field of federal legislation.

"No one, I am sure, would wish to take any backward step. The regulation of the railways of the country by federal commission has had admirable results and has fully justified the hopes and expectations of those by whom the policy of regulation was originally proposed. The question is not what should we undo? It is, whether there is anything else we can do that would supply us with effective means, in the very process of regulation, for bettering the conditions under which the railroads are operated and for making them more useful servants of the country as a whole. It seems to me that it might be the part of wisdom, therefore, before further legislation in this field is attempted, to look at the whole problem of co-ordination and efficiency in the full light of a fresh assessment of circumstance and opinion, as a guide to dealing with the several parts of it."

In this connection Senator Newlands of Nevada is quoted as saying that legislation aiming to give the railroads of the country federal instead of State incorporation would be sought in the present term of Congress. Plans are also said to be under way to obtain federal supervision of railroad securities, to increase the membership of the Interstate Commerce Commission, and to divide the railroads into Eastern, Middle Western, and Far Western groups, each section to be under regulatory supervision of a separate branch of the commission.

NETWORK OF HYDRO-RADIALS PROPOSED IN ONTARIO

Details of the hydro-radial project, advocated by Sir Adam Beck and the Hydro-Electric Power Commission of Ontario in conjunction with certain municipalities in Western Ontario, were laid before the Toronto Board of Control on Dec. 3. Accompanying the details were the draft by-law, which the city is asked to indorse, and a copy of the agreement which the city will have to enter into with the Hydro-Electric Commission. The latter relates to the construction and operation of the lines. The entire project, as outlined, calls for an expenditure of $13,734,155, of which the city of Toronto will have to contribute $4,240,196, or slightly less than one-third of the total cost. This is the amount the people will be asked to authorize, provided the Council indorses the proposition and decides to submit it to the people on Jan. 1.

This will be a separate and distinct undertaking from the scheme for improving the transportation facilities within the city proper. The proposed undertaking is aimed to provide increased transportation facilities over a large area radiating from Toronto to Guelph, London and Sarnia. In addition to the heavy capital expenditure for construction of the lines, the municipalities affected will have to assume responsibility for the large operating and maintenance charges, should the revenue not suffice to meet the same. Further, the scheme now presented only makes provision for radials to the west of the city. Another scheme dealing with the eastern section of the province will be submitted at a later date. The eastern scheme, however, will not be such a serious undertaking for the city, as while no mention is made of it in the report presented on Dec. 3, it may be assumed that sufficient accommodation will be provided at the proposed central terminal station, which is to be erected at the foot of Yonge Street, to care for all traffic, both east and west.

In addition to the $4,240,196, the city is to provide a free right-of-way for the railway and power lines of the commission over and through any property owned by the city, and to convey the same or to execute an agreement for its free use, as the commission shall deem advisable.

The initial cost will be divided between thirty-two municipalities, Toronto being the largest contributor with $4,240,196, London coming second with $1,109,303. It is also pointed out that the city of Toronto will be required not to grant any more franchises to railway or other transportation companies without the consent of the Hydro-Electric Power Commission. The commission will undertake to finance the scheme and to do the actual construction work. Debentures covering the amounts allotted to the several municipalities are to be issued and handed over to the commission, which will retain or hypothecate them as it considers desirable.

Mayor Church announced on Dec. 1 after a conference between Sir Adam Beck and the Board of Control that the question of submission of a by-law to guarantee $3,000,000 bonds for these hydroelectric radials would be laid before Council at a special meeting on Dec. 8.

At a joint conference of the Port Credit Village Council and the engineers of the Hydro Commission held on Nov. 30 a resolution was passed by the Council indorsing the route selected by the commission for the Toronto to London line through the municipality. The deputation asked that facts as to cost, etc., be presented to Council in time for discussion at the next regular meeting, when a by-law will be put through to enable the people to vote on the question at the municipal election. Chief Engineer Gaby explained to the deputation that the line is to be the main power line that will link up scores of municipalities of western Ontario with a rapid transit system over a private right-of-way, coupling the speed of the steam roads with the frequency of a local street car service.

The outlook is not at all propitious for Federal assistance by way of subsidy to this scheme. Two years ago the largest delegation that ever went to Ottawa urged subsidizing these roads as a great movement for the benefit of the people. Nothing was done then, and the policy was laid down last session that because of the war there should be no railway subsidies of any kind.

EXPOSITION GATES CLOSE AFTER SUCCESSFUL AND PROFITABLE SEASON

The Panama-Pacific International Exposition officially closed its gates at midnight on Dec. 4 with ceremonies attended by record-breaking crowds. The closing day exercises began at high noon in the Court of the Universe, when President Moore of the exposition read a toast from President Wilson and a reply thereto. The several palaces were closed by President Moore's party making a tour of the grounds, meeting the chief of each department at the entrance to each palace, where there were a few words of official congratulations, after which a herald in the historic costume of the Town Crier announced the building closed. Prosperity week electrical parade, aeroplane flights, and a continuous illumination and fireworks display during the evening were features of the program. At midnight President Moore closed a switch in the Court of the Universe, turning off the lights and leaving the grounds in semi-darkness. This was a signal for a corps of buglers on the darkened Tower of Jewels to sound taps in requiem toward the four points of the compass.

After the gates closed on Dec. 4 the total number of admissions recorded was 19,876,000, of which approximately 13,000,000 were paid admissions. Reviewing the financial history of the exposition in a general way it may be said that the income during the operating period exceeded all operating expenses by $2,572,000. The net earnings are estimated at $1,360,000. The Municipal Auditorium, which cost $1,086,000, was presented to the city by the exposition as a memorial. The disposal of the net profit from the operating period has not yet been decided upon, but efforts are being made to induce stockholders to assign it to the preservation of parts of the exposition, particularly a boulevard that would follow the present Marina and connect with the Ocean Highway.

GENERAL MANAGER WRIGHT ON WILKES-BARRE STRIKE SITUATION

Renewed riots marked developments in the strike of the carmen of the Wilkes-Barre (Pa.) Railway during the week ended Dec. 5. Additional men of the State Constabulary and many extra policemen have served to keep the semblance of order among the lawless element. The company is running cars over almost all of the lines.

In a statement issued by T. A. Wright, general manager of the company, the recent developments in the strike situation were summarized as follows:

"The Chamber of Commerce, for the purpose of settling the strike, appointed a committee which succeeded in bringing about a conference between the company's officials and the men. At the first meeting, on Nov. 27, the chairman of the committee proposed that the question of the validity and finality of the decision of July 10, 1915, be left with Charles E. Rice, judge of the Superior Court of Pennsylvania. National Organizer P. J. Shea, of the carmen, announced that the trainmen repudiated the award, and also the working agreement signed on Jan. 9, 1915. He declared that the men now demanded a new working contract containing a clause giving recognition to the national officers of the association and a protective clause. The protective clause, he said, must provide that whenever a man was discharged he should have the right, if the committee of Local No. 164 demanded it, to have his case decided by a board of three arbitrators, citizens of Luzerne County, to whose decision, if adverse to the general manager, the company must bow.

"The leaders of the men also demanded that the company take back all the men. This the company agreed to do, but refused the demand of the committee that an agreement be entered into in which the company would have no power to discharge an employee, as such action would be tantamount to turning over the control of the property to the employees. The company refused to abrogate the agreement of Jan. 9, on the grounds that such action, together with the refusal of the strikers to abide by the award of July 10, would mean that all agreements, no matter how solemnly entered into, would be subject to the sole interpretation of the men, enforced by their ability to strike at will.

"Evidence of the conciliatory attitude of the company is shown in its willingness to take back all of its striking employees, although the behavior of some of these men both during the strike and previous to it entitles them to absolutely no consideration.

"If the company had agreed to permit the Amalgamated Association to arbitrate every time an incompetent, inefficient or dishonest employee was to be discharged, it would virtually mean the passing of the control of the company from a responsible board of directors to a body of employees who have shown how little they regard a contract that was solemnly signed and sealed. To accept this provision would mean to make the general manager of the company, its president and board of directors mere puppets in the hands of the trainmen.

"It was evident that the question uppermost in the minds of the men was how far they could go to take the control of the company out of the hands of its directors. To have accepted their impossible demands would have been to permit the Amalgamated to decide what men should work for the company, what they would be paid, how long they should work, and where they would work, leaving the owners of the property only the prerogative as to what men it might employ."

CHICAGO COUNCIL IGNORES SMOKE REPORT

By a unanimous vote the report of the committee of the Chicago Association of Commerce on smoke abatement and electrification of railway terminals was ignored by the Chicago City Council at its regular meeting on Dec. 6. Mayor Thompson submitted the report at this meeting, and soon after its presentation an order was introduced and passed unanimously that the committee on railway terminals, an independent body of which John F. Wallace is the chairman, consider immediately the subject of electrification of steam railroads within the city of Chicago. The order states that the committee is to report to the Council at an early date such ordinances as may be necessary to bring about the adoption of electricity as a transportation power where steam power is now employed. It was suggested that the committee begin its work with the passenger facilities, considering first the electrification of the Illinois Central Railroad and the Northwestern Railroad. The permanent railway terminal committee is composed of Walter Fisher, Bion J. Arnold, Edward H. Bennett, L. E. McGann, J. W. Beckwith, Ellis Geiger and John F. Wallace, who is chairman.

OHIO COMPENSATION LAW INTERPRETED

Judge Oppenheimer of the Superior Court at Cincinnati, in a decision handed down on Dec. 1, ruled that the payment of an award by the State Industrial Commission to the dependent of a man killed by accident cannot be construed as preventing the dependent from bringing suit against and recovering damages from a third party to whom the accidental death is due. He holds that the compensation required by the State is a kind of social life insurance and has nothing to do with damages that may be recovered from a third party who causes a death.

The decision was handed down in the case of Mathilda H. Kenning against the Interurban Railway & Terminal Company, Cincinnati. Her husband was an employee of the Fairmount Brewing Company and while driving his wagon was killed by one of the railway's cars. The brewery company was a contributor to the State workmen's compensation fund and the State Industrial Commission granted Mrs. Kenning an award of $3,744. She then brought suit against the railway for damages for her husband's death.

The attorneys for the Interurban Railway & Terminal Company argued that she was estopped from bringing suit against the company to recover damages because she has been granted an award from the State fund and because the railway was a contributor to the fund. Judge Oppenheimer said the compensation law disavows any claim that sums paid by virtue of its provisions shall be full compensation and that Mrs. Kenning was entitled to sue for recovery. He also said that this company is contributing to the State fund for insurance on its own employees only and that the brewery made the contributions which furnished the insurance for Kenning and all its other employees.

AMERICANS TO OPERATE BRAZILIAN STATE RAILWAYS

Negotiations are admitted to be under way whereby the operation of the Brazilian State Railways will be assumed by American interests, displacing the management by English and French interests. The negotiations have been carried on through the Latin American Public Works Corporation, a concern started eight months ago by interests associated with the J. G. White Management Corporation. The head of the corporation is J. W. McCroskey. He is in Brazil in charge of the negotiations with the Brazilian Government and the English and French interests which now operate the Brazilian State Railways. The Brazilian Government has leased its railways to English and French capitalists for a period of years, and it is understood that the Latin-American Public Works Corporation merely plans to take over the lease for the unexpired term. The project, however, will carry with it the necessity of financing for new equipment and possibly for new construction. All the lines are operated by steam but it is stated that electrification of certain lines is being agitated. At the office of the J. G. White Management Association in New York inquirers were referred to Mr. McCloskey.

PROGRESS WITH CINCINNATI TRANSIT MATTERS

The members of the Rapid Transit Commission of Cincinnati, Ohio, made a tour over the proposed route of the rapid transit loop on Nov. 30. A meeting will be held at an early date at which the commission will decide definitely whether "modified route No. 4" will be adopted as it is or further modifications made. The estimate of the cost of construction of the line on this route is $6,000,000. Should no further changes be made the proposition would be ready for submission to a referendum vote at the Presidential primaries in April.

The proposed franchise of the West End Rapid Transit Company, Cincinnati, was approved by all the business organizations in the city at a delegate meeting held on Nov. 30. This road would bring into the city the interurban lines from Anderson's Ferry. The terminus would be at Third and Walnut Streets. The city may purchase the property any time after ten years at a bonus of 25 per cent on the sum invested. Provision is made for the division of the earnings with the city after the guaranteed return has been made to the company.

All trains are to be operated by electricity or other approved motive power. Provision has been made in the franchise which will prevent its interfering in any way with the municipal rapid transit proposition or any other improvement that may be undertaken.

NEW YORK INVESTIGATION CONTINUED

The first witness on Dec. 7 before the legislative committee which is inquiring into the work of the Public Service Commission for the First District of New York was Ashley T. Cole, of counsel for the Kings County Lighting Company. He said that William F. Sheehan, as a partner in the firm of Hatch & Sheehan, attorneys for the company, is custodian of certain books and papers of the concern. Mr. Sheehan was thereupon subpoenaed to bring before the committee all the books and records of the lighting company.

Commissioner Williams was then called. He was asked what part of his opinion regarding the Kings County Lighting Company's rate case was written from the report of Mr. Semple. He said Mr. Semple prepared his report dealing with these four matters after he had conferred with himself and Commissioner Hayward. There was very little difference of opinion between himself and Commissioner Hayward on the points involved. Commissioner Hayward told of his connection with the Kings County Lighting Company's rate case. He took charge of the case after Commissioner Maltbie's term of office expired, but owing to pressure of work he had the case assigned to Commissioner Williams. He admitted he had not written his own opinion in the case until after he had seen Commissioner Williams's. He was asked about his talk with Mr. Semple regarding the oil contract of the company which, it is alleged, was made at a price above that which other companies were paying, and at a time when oil prices were on a decline.

Gas-Electric Car Tested on Muscatine-Iowa City Line.—The initial trip of the first gasoline-electric motor passenger car over the Muscatine & Iowa City Railway, Muscatine, Iowa, was made on Dec. 1, 1915. A. D. Bowen, president of the company, and about forty members of the Muscatine commercial club made the trip to test the equipment. Additional passenger motor cars and freight locomotives have been purchased and full operation will be inaugurated as soon as this equipment is received.

Strike Suspends Service.—No efforts have been made by William B. Cutter, president of the Buffalo & Depew Electric Railway, to operate cars on the line between the Buffalo and the Depew city lines since the strike was called more than three weeks ago. A committee of citizens of Depew has been trying to effect a settlement of the differences between the men and the company, but the officers of the company say the line has never paid and that it cannot increase the wages of the men. This is the only request made by the men.

Effort to Secure Common User Rights in Seattle.—The City Council of Seattle, Wash., has passed a resolution directing Corporation Counsel James Bradford to make application for common user privileges over the Fourth Avenue tracks of the Seattle, Renton & Southern Railway in order that Division "A" of the Seattle Municipal Railway can derive benefits accruing from business at the transcontinental depots on King Street. This is a move on the part of the city to bolster up the earnings of the Municipal Railway, which is being operated at a loss.

Report on Grade Elimination in Dallas.—The Board of Commissioners of Dallas, Tex., has received final recommendations of John Findlay Wallace, the engineering expert retained to investigate and report on the elimination of grade crossings within the city. Mr. Wallace recommends the construction of a belt line around the city and the complete removal of all railroad tracks within the city limits or the use of such intra-city switch tracks only during restricted hours at night. The carrying out of the belt line plan would involve an expenditure of $900,000.

Street Railway Department for Pekin.—The City Council of Pekin, Ill., has introduced an ordinance to establish a street railway department, of which the commissioner of public property and the commissioner of public affairs shall be the heads. Pekin has a 2-mile municipally owned street railway, and the ordinance provides that not less than three nor more than five motormen shall be employed; that their wages shall be fixed by the department; that one of the motormen or conductors shall be appointed foreman; that a watchman and a general repair man be employed; and that the motormen and conductors shall give bond in the sum of $1,000 each with at least two sureties.

Extension Under Subway Car Replacement Order.—The Public Service Commission for the First District of New York has extended the time limit under which the Interborough Rapid Transit Company is required to replace with steel cars all the wooden or composite cars now in use in the subway. Early in November the company asked the commission for an extension of time. The commission referred the subject to its electrical engineer, C. W. Wilder, and on his recommendation it granted an extension to April 1, 1916. From Mr. Wilder's figures it appears that about 195 of the 478 cars had been converted up to the time of his report. The car bodies which are replaced are to be used on the elevated lines.

Chicago Traction Commission Ordinance Delayed.—The ordinance authorizing the creation of a commission to report on the operating, engineering and financial questions involved in the proposed consolidation of the Chicago surface and elevated lines, and the construction of a subway was brought up for passage at the meeting of the Chicago City Council on Dec. 6. A number of important amendments were offered at that meeting and the ordinance was referred back to the local transportation committee for further consideration. It was contemplated that the committee would act on the amendments at a meeting on Dec. 8, so that the ordinance can again be reported to the Council at its next meeting.

Opponents of Milroy Plan Heard.—At a meeting of the sub-committee of what is known as the Milroy street rail-

way committee, held in the Council Chamber at Toledo, Ohio, on Nov. 30, men who voted against the franchise proposition at the polls were again asked for suggestions as to the kind of settlement they wish made. All agreed on municipal ownership and most of them were in favor of a valuation of the street railway property as a going concern. As to the method of paying for the property a variety of suggestions were made. Some of the speakers thought the city could easily float a bond issue that would cover the cost, while others contended that only part payment should be made and the company should take a mortgage on the property for the balance due and remaining under the contract after the initial payment.

Mission of Fort Wayne Conciliatory Board Fails. — The committee of eight business men of Fort Wayne named by Governor Ralston early in November as a "conciliatory board" to try to adjust the differences between the Fort Wayne & Northern Indiana Traction Company and its former employees, announced on Dec. 6 that it had failed in its efforts to effect a settlement of the difficulties which would be acceptable to both parties, and that the committee had, therefore, automatically expired. Travel on the cars in Fort Wayne is increasing despite the efforts of union labor organizations and sympathizers to divert travel to the jitneys. With the advent of cold weather several jitneys have dropped out of service. Some of the men who went out on strike in September have returned to work, starting in as new men and working through the extra list. Efforts are still being made to raise money by popular subscription to stock at $10 per share for the organization of a motor bus company to compete with the street railway.

Commission Upheld in Case Involving New Construction. —The Public Service Commission for the First District of New York has received notification from Albany that the Court of Appeals, without opinion, had decided in its favor a case involving the double tracking of the Castle Avenue surface railway of the Richmond Light & Railroad Company, in the borough of Richmond. After investigation the commission in 1913 ordered the company to construct and operate such extra tracks as may be necessary to provide a complete double-track railroad on this line between St. George, New Brighton and Broadway, West New Brighton; the work to be begun by June 1, 1913, and to be completed by Nov. 1, 1913. The company took the matter into the courts, and by appeal from each lower division to the Court of Appeals. The decision of the commission was upheld by all the courts. The company contended that the evidence before the commission did not warrant the issuance of the order; that its franchise permitted either a single or double-track line, and that the enforcement of the statutory penalty of $5,000 a day for violation of the order would deprive it of its property without due process of law, and therefore be a violation of the State and national constitutions.

Wage Arbitration Decided Upon in Charleston.—The differences between the Charleston Consolidated Railway & Lighting Company, Charleston, S. C., and the motormen and conductors employed by it will be referred to arbitration. The following statement has been issued by the company: "The committee of the motormen and conductors called on the president and advised him that at a meeting of the men, held after his talk to them, the proposition of the company had been rejected and that the motormen and conductors, in accordance with the terms of the contract with the company, propose that the differences in the matter of wages be settled by arbitration. Section 23 of the contract with the local union provides that all matters in regard to wages * * * shall be submitted to arbitration, said board of arbitration to consist of one man to be named by the company and one man to be named by the association, and the two arbitrators chosen shall name a third arbitrator, provided the first two fail to agree. Either side failing to name its arbitrator within five days forfeits the case. Mr. Gadsden told the committee that the company was, of course, prepared to abide by the arbitration provision as contained in the agreement with the men, and that he will appoint the arbitrator on the part of the company within the time prescribed by the agreement. It is the disposition of both parties to name their respective arbitrators as soon as practicable."

Financial and Corporate

ANNUAL REPORT

Bay State Street Railway

The statement of income, profit and loss of the Bay State Street Railway, Boston, Mass., for the year ended June 30, 1915, as presented in the annual report of the controlling company, the Massachusetts Electric Companies, follows:

Operating revenue		$9,538,406
Operating expenses		6,897,752
Net operating revenue		$2,640,654
Taxes		653,380
Operating income		$1,987,274
Non-operating income		66,459
Gross income		$2,053,733
Deductions from gross income:		
Rent leased roads	$182,228	
Interest funded debt	1,039,076	
Interest unfunded debt	104,279	
Miscellaneous	25,599	
Total deductions		$1,351,183
Net income		$702,550
Dividends:		
First preferred stock at 6 per cent	$164,916	
Common stock at 2½ per cent	512,930	
Total dividends		$677,846
Net income less dividends		$24,704
Surplus, June 30, 1914		213,532
		$238,236
Profit and loss debits	$253,481	
Miscellaneous profit and loss credits	20,996	
Net debit		$232,485
Surplus, June 30, 1915		$5,751

The operating company felt the depression in business conditions during the year. The passenger earnings, instead of the usual increase, showed a loss for the year of $133,535, a result undoubtedly brought about in part by jitney competition. Other branches of the business, however, were not so seriously affected, so that the year resulted in a decrease of $75,746 or 0.78 per cent in total operating revenues. The expenses, owing to increases in wages and commission rulings, showed a heavy increase of $469,888 or 7.3 per cent. As a result the net operating revenue decreased $545,635 or 17.1 per cent. Taxes increased $10,057, and non-operating income decreased $14,637, so that the gross income of the company fell off $570,329 or 21.3 per cent. Deductions from income increased $42,392 during the year and helped the net income to drop from $1,315,270 to $702,549, a decrease of $612,721.

To offset this falling off in business dividends were reduced $564,223, which left a balance for the year of $24,703, a decrease of $48,498 from the previous year. This with the company's surplus on June 30, 1914, gave a surplus of $238,235. Of this amount the company was forced to spend for sinking fund appropriation, $5,090; for loss on property retired, $23,067; for miscellaneous debits, $9,339, and reconstruction, $215,984, the last figure alone being an increase of $109,984 over the previous year. Total debits amounted to $253,481, an increase of $135,138, which with a credit of $20,996 left a surplus on June 30, 1915, of only $5,751, a decrease of $207,780.

The arbitration of the wage dispute between the Bay State Street Railway and its employees was decided June 21, 1915. The award was for the period between Sept. 30, 1914, and Oct. 1, 1916. By that award increases in wages, from Oct. 1, 1914, to July 1, 1915, amounting to $46,000, were granted. From June 30, 1915, to July 1, 1916, the estimated increase in wages under the award will amount to $247,000. From July 1, 1916, to Sept. 30, 1916, both inclusive, the estimated increase will amount to $80,000 more than for the corresponding period of the previous year.

During the last year the Interstate Commerce Commission ruled that the non-betterment part of reconstruction work must be charged to operating expenses in the year in which the work is done, and the accrued amount must be charged off in three years. The company had formerly charged the

balance after betterment to a suspense account until such time as net income would permit it to be wiped out. As a result of the new rule the estimated non-betterment part of the reconstruction completed during the year, amounting to $182,851, was charged to operating expenses, and one-third of the non-betterment part of reconstruction completed prior to the beginning of the year, amounting to $215,984, was charged off to profit and loss account, leaving $431,969 to be charged off during the next two years. During the last year the commission also ordered companies to estimate the amount of depreciation of equipment. As a result, $120,000 was charged to expenses last year.

Jitney competition first appeared at Fall River, and gradually extended to such an extent that on Nov. 1 there were 655 jitneys and jitney buses licensed in twelve cities and one town in the company's territory, and seventy-one were being operated in cities where no licenses are required. In November this competition caused an estimated loss to the company of about $700 per day. In view of this and other conditions the directors decided that the rates of transportation must be increased in order to secure a reasonable return on its investment and attract new capital, and hearings to this end are now being held before the Massachusetts Public Service Commission.

During the year an amount of $1,052,308 was spent for new property and reconstruction. A total of 3.77 miles of new track was constructed, 18.94 miles were reconstructed and 2.26 miles of reconstruction were in progress at the close of the year. About $40,000, out of a total requirement of $110,000, was spent in lowering car steps in compliance with the orders of the commission. No new capital was issued during the year by the Massachusetts Electric Companies. The Bay State Street Railway received authority to issue 12,819 shares of first preferred stock, but none has yet been issued.

EMPIRE UNITED READJUSTMENT PLAN

Clifford D. Beebe, president Empire United Railways, Inc., Syracuse, N. Y., recently announced that the directors had considered a readjustment of the company's finances and particularly the situation of the Rochester, Syracuse & Eastern Railroad first mortgage 5 per cent bonds. As a result they decided to recommend to the bondholders the following plan:

(1) That they accept a reduction in interest from 5 per cent to 3 per cent for a period of five years from Nov. 1, 1915, in connection with settlement of the Nov. 1, 1915, coupons either in securities, or, if possible for the company, in cash.

(2) That the holders of the securities of the Empire United Railways, Inc., and its indebtedness should accept in place of what they now have, securities without a fixed charge or on an income basis.

(3) That there should also be provided, without calling upon the underlying bondholders for assistance, between $300,000 and $400,000, to be used in taking care of capital expenditures for the next two years, particularly the forced capital expenditures in the way of paving and other requirements in the villages along the line which would affect the bondholders; also to take care of the car trust obligations outstanding as they mature.

(4) That there should be provided sufficient other funds for the company to be left free of all other indebtedness and with no fixed charge outside of the underlying bonds, so that all the net income which the company might earn on the different divisions would be first applicable to the underlying bonds, which would insure prompt payment of the semi-annual interest thereon.

Previous items regarding the recent receivership of this company under H. S. Holden and C. Loomis Allen were published in the Electric Railway Journal of Nov. 13 and Dec. 4.

Atlantic City & Shore Railroad, Atlantic City, N. J.—The Atlantic City & Shore Railroad being unable, owing to jitney competition, to pay the interest due Dec. 1 on its $950,000 of first mortgage 5 per cent bonds, the following bondholders' committee has been organized: G. Burmham, Jr., Harry C. Francis, Frank H. Bachman of Philadelphia, T. Johnson of Wilmington and David Fitzsimmons of Atlantic City. A call for deposit of the bonds will probably be made in a short time. The appointment of Clarence C. Cole as receiver of the company was noted in the Electric Railway Journal of Dec. 4.

Birmingham-Tuscaloosa Railway & Utilities Company, Tuscaloosa, Ala.—The Birmingham-Tuscaloosa Railway & Utilities Company has filed papers in the Probate Court showing that at a recent meeting of the stockholders and directors the name of the company was changed to that of Tuscaloosa Railway & Utilities Company, and the capital stock of the company reduced from $3,500,000 to $3,000,000. The president is authorized to refund and retire outstanding collateral trust notes, and retire the trust agreement with the Girard Trust Company and mortgages with the Fidelity Trust Company. He is also authorized to issue $1,000,000 of first mortgage 6 per cent twenty-five-year gold bonds and complete arrangements with the Republic Trust Company, Philadelphia, as trustee. The company owns and operates the 14-mile street railway through Tuscaloosa to Holt, and does a lighting business in Tuscaloosa.

Brooklyn (N. Y.) Rapid Transit Company.—Holders of the $59,699,000 of 5 per cent six-year gold notes of 1912, due on July 1, 1918, of the Brooklyn Rapid Transit Company have been reminded that their option will expire with the close of business on Dec. 31 to exchange their notes, with all unmatured coupons attached, for an equal face amount of first mortgage 5 per cent sinking fund gold bonds of the New York Municipal Railway Corporation. These bonds are in coupon form with all unmatured coupons attached, and bear the endorsement of the Brooklyn Rapid Transit Company and of the New York Consolidated Railroad Company agreeing to pay principal and interest thereon. To exercise the option the notes must be presented, in bearer form with all unmatured coupons attached, at the Central Trust Company of New York. The New York Municipal Railway Corporation pays the normal income tax on these bonds and the corporation has also paid the tax on the mortgage securing the same, so that the bonds are exempt from local taxation as provided by the laws of the State.

Buffalo & Susquehanna Railroad, Buffalo, N. Y.—The abandoned property of the Buffalo & Susquehanna Railroad between Buffalo and Wellsville has been bought by a syndicate consisting of C. A. Finnegan and Theodore Hofeller, Buffalo, and Abraham Weber, of S. Weber & Son, Louisville, Ky. The purchase price was $800,000, the obligations outstanding being assumed. Martin Bogue, of Bertron, Griscom & Company, New York, acted for the committee of bondholders in making the sale. The new owners will operate the road, and it is understood experts will make a study of the traffic and transportation problems with a view of recommending the installation of electrical equipment. Included in the purchase is a 25-acre plot, fronting on the inner harbor of Buffalo and possessing 2000 ft. of dockage space suitable for grain elevators. Previous notes referring to an option held on this section by interests connected with the Western New York & Pennsylvania Traction Company were published in the Electric Railway Journal of July 17 and Oct. 2.

City Railway, Los Angeles, Cal.—The City Railway of Los Angeles has filed with the California Railroad Commission an application for authority to issue 349 bonds, face value of $349,000, to the Los Angeles Railway Corporation in payment of money advanced and used for betterments and improvements.

Grand Valley Railroad, Brantford, Ont.—At a special meeting of the Brantford City Council it was decided to give ratepayers of the city a chance to vote on the ratification of the sale of the section of the Grand Valley Railway between Paris and Galt to the Lake Erie & Northern Railway, which railway is controlled by the Canadian Pacific Railway. The price set, as noted in the Electric Railway Journal of Aug. 21, was $30,000, with a promise of the electrification of the Lake Erie & Northern Railway from Galt to Port Dover. C. H. Hartman, chairman of the Brantford Municipal Railway Commission, is the only one opposed to the transaction. The general manager of the Galt, Preston & Hespeler Railway, who is acting for the Canadian Pacific Railway in the matter, had given the Council

until Dec. 4 to act, but later it was decided to wait until the people had had a chance to approve the sale. It was asserted that the line would be in operation within a month under electric power.

Interborough Consolidated Corporation, New York, N. Y.—Out of the surplus of the Interborough Consolidated Corporation the directors have purchased for investment $500,000 of Interborough-Metropolitan Company 4½ per cent collateral bonds on a 6 per cent basis. The Interborough Consolidated Corporation has also anticipated the sinking fund requirements on the $3,000,000 of 6 per cent ten-year Interborough-Metropolitan notes by purchasing $500,000 of the notes, or $200,000 in excess of sinking fund requirements for the year. At this rate the notes will all be retired considerably before their maturity.

Interborough Rapid Transit Company, New York, N. Y.—The Interborough Rapid Transit Company has sold to J. P. Morgan & Company $20,000,000 of first and refunding 5 per cent bonds, making a total of $30,000,000 of the bonds sold under the agreement with the bankers to provide money this year for new subway construction. The bonds are a part of the $300,000,000 mortgage authorized in 1913, and $128,658,000 of the bonds are now outstanding. Under the agreement the bankers can take more bonds of this issue to the amount of $27,342,000. It is understood that the same group of investment houses that placed previous bonds of this issue will distribute the amount now purchased.

Mansfield Public Utility & Service Company, Mansfield, Ohio.—The Ohio Public Utilities Commission on Nov. 30 authorized the Mansfield Public Utility & Service Company to issue $3,500 of common stock at not less than par. The proceeds are to be applied to the payment of the purchase price for the property and assets of the old Mansfield Railway, Light & Power Company, acquired at public sale last September, as noted in the ELECTRIC RAILWAY JOURNAL of Oct. 16.

Memphis, (Tenn.) Street Railway.—The $30,000,000 mortgage of the Memphis Street Railway recently filed with the Guaranty Trust Company, New York, as noted in the ELECTRIC RAILWAY JOURNAL of Nov. 20, secures an issue of general mortgage bonds bearing interest at not more than 6 per cent, dated Nov. 1, 1915, and due on Nov. 1, 1935. The immediate issue of $492,000 (6 per cent) is pledged as part collateral for the $1,500,000 of two-year 6 per cent collateral notes sold last October for refunding purposes and working capital. The total authorized issue of general mortgage bonds is $30,000,000, but $10,000,000 of this amount is reserved to retire a like sum of consolidated (now first) mortgage 5 per cent bonds, including the $1,416,000 of the latter pledged under the aforesaid note issue. In addition to the two-year note issue there were sold last October $600,000 of one-year 6 per cent guaranteed gold notes, and it was agreed that so long as these guaranteed gold notes are outstanding the company shall not issue its general mortgage bonds in an amount to exceed a total of $650,000, except with the consent of the holders of two-thirds of the collateral notes and of the holders of three-quarters of the guaranteed notes, and then for only 80 per cent of the cost of new construction. The general mortgage bonds are redeemable on any interest date at 102½.

New York (N. Y.) Railways.—John C. Cobb, Charles P. Howland, George B. Leighton, William H. Remick and Richard H. Swartwout have been elected directors of the New York Railways to represent the company's adjustment income bondholders. These men, elected as a result of a successful proxy campaign, are said to be pledged to fight for the payment of full 5 per cent interest on the income bonds. The directors displaced by the above-named five men were mostly representatives of large insurance companies that some time ago withdrew from suits for payment of back interest. They included Darwin P. Kingsley, president New York Life Insurance Company; Henry Ollesheimer, president Metropolitan Bank and director Metropolitan Life Insurance Company; Frank S. Witherbee, president Witherbee, Sherman & Company and director Equitable Life Assurance Society, and Francis L. Leland, president New York County National Bank and director United States Life Insurance Company. The election of the five new directors, however, cannot result in their controlling the board and changing the company's policy in regard to the payment of interest on the income bonds, for the stockholders are allowed to elect six members of the board. Their ticket, elected without opposition, included August Belmont, Edward J. Berwind, Thomas De Witt Cuyler, Theodore P. Shonts, Cornelius Vanderbilt and W. Leon Pepperman, the last named taking the place of the late Andrew Freedman.

San Francisco (Cal.) Municipal Railways.—The total receipts of the San Francisco Municipal Railway system for November are reported to be $233,520, the estimated net being $115,000. The receipts are the second largest in the operation of the system, being exceeded by August, 1915, when a total of $234,159 was reached with one day more of operation. During October, 1915, the total receipts were $214,029.62.

San Joaquin Light & Power Corporation, Bakersfield, Cal.—The San Joaquin Light & Power Corporation has received permission from the California Railroad Commission to renew three promissory notes for a term not exceeding two years from July 15, 1915. Of these notes $100,000 is payable to the Bank of California and $200,000 to the Savings Union Bank & Trust Company. The new notes at 6 per cent are to be to the Hibernia Savings Bank of Los Angeles for $100,000; to the Security Trust & Savings Bank, $150,000, and to the Security National Bank, $50,000. The money from the original issue was expended in construction, extensions and improvements.

Seattle (Wash.) Municipal Street Railway.—The report of A. L. Valentine, superintendent of public utilities, on the operation of the Seattle Municipal Street Railway for October shows that the revenue of Division A amounted to $1,622. The expenses were $2,125, giving a loss of $503 from operation. The revenues of the Lake Burien Line, Division C, amounted to $1,514, with expenses of $2,286, or a loss of $772. The total loss for both lines for the month was $2,868, this figure including $1,593 for interest on bonds.

Syracuse & South Bay Electric Railroad, Syracuse, N. Y.—Justice Andrews on Dec. 4 ordered the foreclosure sale of the Syracuse & South Bay Electric Railroad and the Syracuse, Watertown & St. Lawrence River Railroad. These two companies, which are financially distinct but are operated under one management, were some time ago placed in the hands of Ernest Gonzenbach as receiver, as noted in the ELECTRIC RAILWAY JOURNAL of May 29. The purpose was reported to be a friendly readjustment having in view the consolidation of the two properties. It has not been announced when the sales now ordered will take place or whether they will be made together, but notice of sale must be published for six weeks. The reports of the referees appointed by the court to compute the amounts due trustees of the mortgages were presented to Justice Andrews by E. I. Edgcomb. Referee Carl E. Dorr, who acted in the case of the Bankers' Trust Company, New York, against the Watertown road, reported that the amount due on the mortgage of this company was $236,353. Referee Thomas W. Dixon, who acted in the case of the South Bay line, reported that $591,250 was due on the mortgage held by the Equitable Trust Company, New York.

United Gas & Electric Corporation, New York, N. Y.—A dividend of 3 per cent has been declared on the $9,284,800 of first preferred stock of the United Gas & Electric Corporation, payable on Dec. 30 to holders of record on Dec. 20. This is the first payment since April, 1914. President George Bullock is quoted as saying: "I have every reason to believe that with a continuation of the present prosperity of the company the payment of current dividends from now on will be resumed on our first preferred stock, as the operating results of all the subsidiaries for the past six months have been very gratifying, and substantial increases in both gross and net are being shown by practically all the companies."

United Light & Railways Company, Grand Rapids, Mich.—It is announced that the United Light & Railways Company will on Jan. 1 redeem $500,000 of outstanding notes.

DIVIDENDS DECLARED

Arkansas Valley Railway, Light & Power Company, Pueblo, Col., quarterly, 1¾ per cent, preferred.

Brazilian Traction, Light & Power Company, Ltd., Toronto, Ont., quarterly, 1½ per cent, preferred.

Continental Passenger Railway, Philadelphia, Pa., $3.

Interstate Railways, Camden, N. J., 30 cents, preferred.

United Gas & Electric Corporation, New York, N. Y., 3 per cent, first preferred.

United Light & Railways Company, Grand Rapids, Mich., quarterly, 1½ per cent, first preferred.

United Traction & Electric Company, Providence, R. I., quarterly, 1¼ per cent.

West End Street Railway, Boston, Mass., $2, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

ATLANTIC SHORE RAILWAY, KENNEBUNK, ME.

Period			Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Oct.,	'15	$24,486	$23,839	$647	$612	$35
1 "	"	'14	27,184	26,024	1,160	623	537

AMERICAN RAILWAYS, PHILADELPHIA, PA.

1m.,	Oct.,	'15	$465,261	.....	.....	.....	.....
1 "	"	'14	464,220	.....	.....	.....	.....
10 "	"	'15	4,468,635	.....	.....	.....	.....
10 "	"	'14	4,638,925	.....	.....	.....	.....

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

1m.,	Sept.,	'15	$12,040	*$8,536	$3,504	$1,103	$2,401
1 "	"	'14	13,080	*9,240	3,840	1,105	2,735
12 "	"	'15	115,736	*98,381	17,355	13,600	3,755
12 "	"	'14	120,480	*100,965	19,515	12,845	6,670

BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.

1m.,	Oct.,	'15	$81,179	*$67,879	$13,300	$16,846	††$3,383
1 "	"	'14	90,000	*97,653	†7,653	17,372	††24,883
4 "	"	'15	352,735	*259,633	93,152	67,741	‡26,016
4 "	"	'14	375,320	*334,996	40,324	68,607	††27,552

CONNECTICUT COMPANY, NEW HAVEN, CONN.

1m.,	Oct.,	'15	$711,185	*$508,783	$202,402	$98,014	‡$127,637
1 "	"	'14	654,584	*500,921	*153,663	98,754	‡76,686
4 "	"	'15	3,067,969	*2,008,869	*1,059,100	392,430	‡759,458
4 "	"	'14	2,959,943	*2,175,961	*783,982	393,860	‡476,627

CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY, CLEVELAND, OHIO

1m.,	Oct.,	'15	$109,962	*$77,199	$32,763	$27,526	‡$5,319
1 "	"	'14	107,610	*70,836	36,774	27,478	‡9,296
10 "	"	'15	1,030,094	*696,754	333,340	274,987	‡59,319
10 "	"	'14	1,058,200	*683,804	374,396	273,456	‡100,940

LAKE SHORE ELECTRIC RAILWAY CLEVELAND, OHIO

1m.,	Oct.,	'15	$118,315	*$75,476	$42,839	$36,283	$6,556
1 "	"	'14	113,777	*72,977	40,800	35,801	4,999
10 "	"	'15	1,150,649	*746,619	404,030	361,116	42,914
10 "	"	'14	1,212,704	*746,859	465,845	335,038	130,807

NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.

1m.,	Oct.,	'15	$28,216	*$24,278	$3,938	$8,005	††$4,011
1 "	"	'14	27,142	*25,085	2,057	7,876	††5,776
4 "	"	'15	161,568	*111,030	50,538	32,005	‡18,796
4 "	"	'14	166,375	*115,642	50,733	31,503	‡19,446

NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.

1m.,	Oct.,	'15	$45,190	*$40,898	$4,292	§$4,495	††$1,129
1 "	"	'14	39,074	*42,943	†3,869	§5,873	††8,209
4 "	"	'15	170,076	*166,354	3,722	§25,038	††14,412
4 "	"	'14	149,223	*171,132	†21,909	§23,695	††39,147

RHODE ISLAND COMPANY, PROVIDENCE, R. I.

1m.,	Oct.,	'15	$439,590	*$342,111	$97,479	$120,284	‡$4,630
1 "	"	'14	440,696	*337,179	103,517	118,551	‡13,004
4 "	"	'15	1,898,150	*1,363,843	534,307	481,674	‡84,313
4 "	"	'14	1,979,491	*1,381,168	598,323	474,500	‡158,498

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.

1m.,	Oct.,	'15	$806,542	$488,732	$317,810	$142,969	‡$175,882
1 "	"	'14	798,732	473,343	325,389	132,777	‡193,977
10 "	"	'15	7,802,968	5,020,123	2,782,844	1,354,075	‡1,448,242
10 "	"	'14	7,735,571	4,789,642	2,945,928	1,309,280	‡1,647,804

WESTCHESTER STREET RAILWAY, WHITE PLAINS, N. Y.

1m.,	Oct.,	'15	$22,249	*$21,719	$530	$1,607	††$1,049
1 "	"	'14	22,995	*23,947	†952	1,298	††2,237
4 "	"	'15	96,381	*87,792	8,589	6,393	‡2,315
4 "	"	'14	103,633	*94,954	8,679	4,911	‡3,818

*Includes taxes. †Deficit. ‡Includes non-operating income. §Excludes interest on bonds, charged income and paid by the N. Y., N. H. & H. R. R., under guarantee; also interest on notes held by the N. Y., N. H. & H. R. R. not credited to income of that company.

Traffic and Transportation

ACCIDENTS IN NEW YORK DECREASE

Near-Side Stops in Use Since 1914 Said to Be Responsible for Good Showing

Surface cars in Greater New York have been making the near-side stop since Sept. 1, 1914. There has never been a month during this period in which there has not been a decrease in the number of street accidents. Frequent reports have been issued by the Safety First Society during the past year containing statistics bearing out the contention of the organization's official that it would prove to be one of the greatest factors in reducing the number of accidents and fatalities in Greater New York. A tabulation of street accidents for the five months from June 1 to Oct. 31 of this year as compared with the same months last year follows:

	1914	1915
Car collisions	582	366
Persons struck	1,489	1,251
Vehicles struck	5,973	5,744
Boarding	3,236	2,685
Alighting	4,831	4,038
	16,111	14,084

This statement contains both fatal and non-fatal accidents, but for ascertaining the success of the ordinance as regards fatalities, the following compilation has been made for the same periods:

	1914	1915
Car collisions	0	0
Persons struck	31	25
Vehicles struck	12	2
Boarding	4	1
Alighting	8	7
	55	35

In Manhattan, where there are more congested sections, the success of the ordinance remains indisputable. The Safety First Society particularly requested the Public Service Commission to compile a tabulation of the accidents involving the operation of street cars during June, July, August, September and October when the schools are closed and the children are using the streets more than at any other time in the year. In Manhattan the figures show a decrease of 1219 accidents, with fatalities reduced from twenty-nine a year ago to seventeen this year. The Brooklyn and Queens statistics have been combined, as there are several companies operating in both boroughs. The decrease in this section shows a total of 482, there having been 7096 accidents during the period indicated last year as compared to 6614 this year. The fatalities have almost been cut in two, there having been twenty deaths recorded last year as compared to eleven this year.

There have been no increases, either in fatal or non-fatal accidents, in the Borough of Manhattan during the present year, while in the Brooklyn-Queens section there has been an increase of 111 accidents involving persons boarding cars, and an increase in the number of accidents wherein people were killed while alighting from street cars. This tabulation, showing a general average decrease in street car accidents, offers conclusive proof of the successful operation of the near-side stop ordinance, and the Safety First Society officials also contend that the installation of the "car stop-safety zones," have been of much assistance in providing better safeguards for the patrons of the surface lines.

PENALTIES CLAIMED IN MILWAUKEE

Violations Charged of the Railroad Commission's Service Order Issued in 1913

The State of Wisconsin, in an action begun on Dec. 6 in the Circuit Court for Dane County, charging violations of the order of the Railroad Commission issued on Dec. 25, 1913, fixing standards for street railway service in Milwaukee, has sued The Milwaukee Electric Railway & Light Company for penalties aggregating $186,000. The State's complaint comprises a document of over 225 pages, and is based on data furnished by City Attorney Hoan, who was elected on the Socialist ticket. The company has twenty days in which to answer, which will bring the case on for trial at the January term of the Dane County Circuit Court.

The complaint charges specifically 186 separate violations

of the commission's order. It is charged, in each instance, designating the time and place and the number of passengers carried, the number of seats furnished and the number of seats required under the order, that the street railway "failed, refused and neglected" to furnish the number of seats required, "all in violation of said order and contrary to law." It is alleged in each instance that "the defendant thereby became indebted to the State of Wisconsin in the sum of $1,000, whereby a right of action accrued to the State of Wisconsin for the recovery thereof, by virtue of and pursuant to the provisions of Secs. 1797-27 and 1797-31, Wis. Stat." The statutes referred to prescribe a penalty of $100 to $10,000 in the discretion of the court for any neglect, failure or refusal by a railway company to obey any lawful requirement of a service order of the commission.

After the service order on which the suit is based was issued by the commission the company complained that it was vague and impracticable of application in its existing form and applied to the commission for an interpretation and modification of the order. At its request a hearing was granted on these points, and testimony was presented to justify its claims by the company about a year ago, but no decision has been handed down by the commission. The violations which are alleged to have been committed occurred after the company had applied for this interpretation of the order.

Lexington Employees' Publication.—Employees of the Kentucky Traction & Terminal Company, Lexington, Ky., have begun publication of *The Employees' Bulletin.*

Hoboken Fare Hearing on Jan. 12.—The application of the city of Hoboken to require the Public Service Railway to operate for a 3-cent fare in Hoboken will be heard by the Board of Public Utility Commissioners of New Jersey in the court house in Jersey City on Jan. 12.

St. Louis Skip Stop Report to Be Filed Dec. 15.—The time of filing the report on the stop elimination test by the United Railways, St. Louis, Mo., has been extended until Dec. 15, on an order made by the State Public Service Commission. John M. Atkinson, chairman of the commission, said that a hearing would be held in St. Louis before the report is filed by the company.

Jitney Measure Before Newark Council.—The Newark, N. J., jitney ordinance, referred to in the ELECTRIC RAILWAY JOURNAL of Nov. 20, was approved by the license committee of the Common Council on Dec. 2. On Dec. 3 the measure was passed on first and second reading and ordered to a third reading and then recommitted to the license committee.

Prize Contest by Elevated in Chicago.—The Chicago (Ill.) Elevated Railroads has announced through *Elevated News,* its official publication, a contest to close on Dec. 31, in which the person sending in the best letter on "An Experience with "Elevated Service" (telling how the elevated has helped him in some way) will be awarded a cash prize of $25; the person sending in the next best letter, a cash prize of $15; and the third, a cash prize of $10.

New Orleans Jitney Ordinance Held "Ultra Vires."—The Supreme Court of Louisiana has annulled the New Orleans ordinance on the ground that while the municipality had the power to regulate jitneys, along with other vehicles, a measure that is in fact prohibitory is *ultra vires* and void. The court held that the city had no power to interdict the use of the streets to vehicles such as are commonly operated in cities any more than it had the power to interdict their use by pedestrians.

Fresh-Air Car for Texas Line.—The Bryan & College Interurban Railway, Bryan, Tex., has ordered what it describes as "a large windowless electric car." In order to induce travel for health and pleasure the company will operate the car every Sunday from 4 p. m., to 7 p. m., between Villa Maria and College Station at 10 cents for the round trip, a rate less than 1 cent a mile. This arrangement will not affect the regular schedule or the regular rate of 25 cents between Bryan and College and 10 cents between Bryan and Villa Maria.

Change in Route of Washington Jitneys Allowed.—The Public Utilities Commission of the District of Columbia has granted the application of the District Jitney Bus Company for permission to discontinue operation over the route authorized by the commission's order No. 166, dated Oct. 27, 1915, and hereafter to operate from Eighth Street and Pennsylvania Avenue, N. W., west on Pennsylvania Avenue to Fifteenth Street, north on Fifteenth Street to Massachusetts Avenue, west on Massachusetts Avenue to Sixteenth Street, north on Sixteenth Street to U Street, and return.

Reduction in Fare Ordered.—The Public Service Commission of Washington has ordered the Gray's Harbor Railway & Light Company, Aberdeen, Wash., to reduce to 5 cents the single-trip fare between Cosmopolis and Aberdeen. The fare heretofore has been 10 cents. The commission finds that since the Cosmopolis line is only 0.625 miles long, and most Cosmopolis patrons ride only to the mill section of Aberdeen, the average trip from Cosmopolis to Aberdeen actually is shorter and less expensive to the company than the average trip within the city limits of Aberdeen, for which only 5 cents is charged.

Route Changes Ordered in Los Angeles.—In order to relieve traffic congestion in the business district, the Board of Public Utilities of Los Angeles, Cal., has issued an order, effective on Dec. 1, which calls for a complete revision of the car routing plan in the down-town system of the Los Angeles Railway Corporation. Ten existing car lines are to be discontinued and twelve new lines established, while the practice of turning cars back is to be discontinued. The plan does away with curves as far as possible, and in the main only straight line crossings are to be permitted. However, the present service on Broadway and Hill Streets, two of the busiest thoroughfares, will not be disturbed.

Jitney News from Fort Worth and Austin.—The jitney ordinance of Fort Worth, Tex., has again been held constitutional and the right of the city to regulate the jitneys upheld in a decree handed down by the Court of Civil Appeals for the Second Supreme Judicial District, which affirms the judgment of the Sixty-Seventh District Court in the case of the Auto Transit Company of Fort Worth versus the city of Fort Worth. The case was filed in the form of an application for an injunction to prevent the enforcement of the ordinance. Jitneys in Austin, Tex., ceased operating on Nov. 30, with the enforcement of the regulatory ordinance which has been upheld both in the Corporation Court and the Court of Criminal Appeals. The operators claim that the Austin law is too stringent to render the business profitable.

Voluntary Reduction in Interurban Fares.—L. H. Bean, manager of the Seattle-Tacoma interurban line of the Puget Sound Electric Railway, Tacoma, Wash., has announced a voluntary reduction in passenger fares between Seattle and Georgetown, including points south in the Duwamish Valley. The new rates to become effective on Nov. 25. A. W. Leonard, president of the Puget Sound Traction, Light & Power Company, in speaking of the reduction, said: "The company in making the reduction in fares on the Seattle-Tacoma interurban system, including the Renton line, does so in the belief that its service, which will be as good as can be found on similar lines in this country, will receive the patronage and support it deserves. The move is in the nature of an experiment. It is expected that the people of the valley will prefer our dependable service to disjointed, irresponsible and unreliable jitney service. The service will be of high order, and it will be made permanent if the patronage warrants it. There will be transfer privileges on all fares." The round-trip fare between Georgetown and Renton has been reduced from 54 cents to 28 cents.

Only Twelve Fatal Accidents in New York City in October.—The engineers of the Public Service Commission for the First District of New York have made a report upon the accidents occurring on railroads and street railroads in that district for the month of October, 1915. The report shows that only twelve persons were killed during the month. This is the smallest total in the history of the commission. The largest number of fatalities ever reported was in the month of September, 1907, when sixty-three persons lost their lives. When the commission was created the number of persons killed ranged from 500 to 600 a

year. This has been practically cut in two, notwithstanding the greatly increased traffic. The report for October shows a decrease in the number of accidents as well as in the fatalities. The total number of accidents was 5395 against 5519 for October of last year. Of the total 3920 accidents occurred on surface lines, 950 on subway and elevated lines, 509 on railroad trunk lines, twelve on railroad terminal lines and three on motor bus lines. Of the killed six met death on the surface lines, four on the subway and elevated lines, one on railroad trunk lines and one on a railroad terminal line.

Chicago Company Seeks Relief from Wagon Traffic.—Underneath a line cut showing a heavily-loaded dray broken down on the car tracks the Chicago (Ill.) Surface Lines in a recent daily newspaper advertisement said: "Were you late for work this morning? How many times have you been late this year owing to delays in street car traffic caused by wagons and trucks whose drivers refuse to get out of the car tracks, or by breakdowns of vehicles in the car tracks? We want to improve our service. Our problem is one of track capacity. With the limited number of outlets from the loop we can move only so many cars in a given time. We can move the maximum number of cars only if we can have the maximum use of our tracks. We can do nothing to correct present conditions until the City Council passes an ordinance giving us the use of our tracks —at least during rush hours. The present ordinance permits the obstruction of traffic by vehicles. If you want better service, write a letter to your aldermen, or to the local transportation committee, telling them that you want such an ordinance, and why. The City Council will respond to your wishes if you will take the trouble to express them. Write your letter to-day."

Schenectady Service Questions Before Commission.—James F. Hamilton, general manager Schenectady (N. Y.) Railway, agreed before the Public Service Commission of the Second District on Dec. 1 to have the Schenectady cars east-bound make the regular stops between the city line and Watervliet Avenue for the accommodation of local passengers. The hearing was on the complaint of residents of Albany against the Schenectady Railway and the United Traction Company as to the transfer situation between the two lines on local traffic. The officials of the road assured the commission that if east-bound cars refused to stop it was probably due to a misunderstanding on the part of the crews and that the matter would be remedied. The company still refuses, however, to carry local west-bound passengers. Recently the commission ordered transfers to be issued and accepted by the two lines for all local passengers, whereupon the Schenectady Railway posted a notice that it would carry no local passengers west. Reuben S. Calkins for the complainants raised anew the question of universal transfers between the two companies. The companies were allowed ten days in which to file any briefs they may wish supplemental to those filed some time ago when the case was up before.

Seeking to Correct Transfer Abuses in Columbus.—A change in the method of issuing and receiving transfers on the cars of the Columbus Railway, Power & Light Company, Columbus, Ohio, has been announced, to be effective at an early date. S. G. McMeen, president of the company, said recently: "The transfer system that has been in use in Columbus for several years has brought about certain practices that have curtailed the legitimate and expected revenues of the company. Whatever the loss to the company may be through the abuse of transfer privileges, it is an earning that not only the company is entitled to, but one that should be counted since it is of benefit to the car riders of the city, to the end that fare reductions may not be precluded or fare increases may not be exaggerated. The company realizes that so great a change from present habits to something radically different, no matter what the necessity, ought not to be made in a moment nor without proper discussion. The mere fact that the company has the power to make these new rules is not sufficient for undue haste. Therefore, we have determined to discuss this whole matter with the people of Columbus before we even set the date for the change. We invite the frankest discussion, criticism and comment."

Personal Mention

Mr. Frank A. Spies has been elected president of the Menominee & Marinette Light & Traction Company, Menominee, Mich., to succeed Mr. Augustus Spies.

Mr. W. E. Nemits, chief clerk to the general claim agent of the Chicago (Ill.) Surface Lines, has been appointed assistant general claim agent.

Mr. Frank J. Gatrell, formerly chief adjuster of the Chicago (Ill.) Surface Lines, has been appointed acting general claim agent to succeed Ralph S. Rowley, deceased.

Mr. Charles Smeeth has been appointed superintendent of the Ironwood & Bessemer Railway & Light Company, Ironwood, Mich., to succeed Mr. F. L. Blackhurst, resigned.

Mr. Frederick B. Van Vorst of New York has been elected to the office of vice-president of the United Railways Investment Company and not to that of secretary, as mentioned in a recent issue.

Mr. W. Leon Pepperman, assistant to the president of the Interborough Rapid Transit Company and the New York (N. Y.) Railways, has been elected a director of the latter company to succeed the late Andrew Freedman.

Mr. George Caywood has been appointed engineer of the power station of the Twin City Rapid Transit Company, Minneapolis, Minn., to succeed Mr. Donald Goodrich, who is superintendent of the Minneapolis division of the company.

Mr. C. K. Minary, president and treasurer of the Benton Harbor-St. Joe Railway & Light Company, Benton Harbor, Mich., has also been appointed manager of the company to succeed Mr. H. C. Mason, whose resignation, effective Dec. 1, was noted in the ELECTRIC RAILWAY JOURNAL of Oct. 30.

Mr. A. J. Klatte has been appointed acting electrical engineer of distribution of the Chicago (Ill.) Surface Lines to succeed Herbert M. Wheeler, deceased. Since the consolidation of the Chicago City Railway and the Chicago Railways as the Chicago Surface Lines Mr. Klatte has served as assistant engineer of electrical distribution.

Mr. Harry H. Hanson, the newly appointed superintendent of Division 7 of the Boston (Mass.) Elevated Railway, entered railroad work in 1889 as conductor on the old Brattle Street line. After three years he was made starter and later became inspector. In 1901, on the opening of the elevated, he was appointed to the position of district supervisor and stationed at Dudley Street. In February, 1913, he was promoted to be superintendent of Division 2, with headquarters at Lenox Street. The approaching completion of the extension of the East Boston tunnel to Bowdoin Square, connecting with Cambridge lines at that point, brought about the consolidation of Division 4 (East Boston) and Division 7 (Cambridge), all under one head, Division 7, and Mr. Hanson was placed in charge.

Mr. W. B. Saunders, formerly consulting engineer of Minneapolis, and previous to that a member of the field staff of H. M. Byllesby & Company, Chicago, has been appointed engineer for the Railroad and Public Service Commission of Montana. Mr. Saunders received his professional education at the University of Wisconsin and first engaged in engineering work on the forces of the Union Pacific Railway in 1901. He served with the Rocky Mountain Bell Telephone Company from 1903 to 1904, and with the Salt Lake Route for a short period in 1905. From the latter year until 1906 he was engineer and construction supervisor for the Michigan State Telephone Company, leaving that work to become assistant engineer in the United States Reclamation Service. He joined the forces of H. M. Byllesby & Company in 1910 and continued with them until 1913. In 1914 he opened offices in Mankato, Minn., to engage in consulting practice.

Mr. George Lorne Guy has been appointed engineer of the Manitoba Public Utilities Commission, Winnipeg. Mr. Guy was born at Portage du Fort, Que., on April 14, 1883, and was educated at Camden East, Newburgh, and Queen's University, Kingston, Ont. From 1899 to 1902 he was armature, transformer, meter and test operator with the Canadian General Electric Company at Peterborough, Ont. From 1902

to 1907 he was chief electrician with Graves, Bigwood & Company, at Byng Inlet, Ont., and during the winter months of these years attended Queen's University. From 1907 to 1908 he was engaged in contract construction work at Camden East, Yarker and Newburgh, Ont. From 1903 to 1910 Mr. Guy was engineer of rolling stock with the Winnipeg (Man.) Electric Railway. From 1910 to 1912 he was engineer with the electrical department of the city of Winnipeg, and from 1912 to 1914 was sales manager of the electrical department of the Canadian H. W. Johns-Manville Company at Winnipeg. Since March 1, 1914, he has been engaged in private practice as a consulting electrical engineer.

Mr. G. Sabin Brush, chief clerk of Division 8 of the Boston (Mass.) Elevated Railway, has been appointed superintendent of the railway department of the Cumberland County Power & Light Company, Portland, Me. Mr. Brush was born at Stillwater, Minn., in 1884. In 1903 he entered the Massachusetts Institute of Technology, taking the course in mechanical engineering, and during vacations he was employed by the Middlesex & Boston Street Railway at Newtonville, Mass. Here Mr. Brush did much original work in the direction of publicity for traffic stimulation, and in 1908 entered the employ of the Boston Elevated Railway in the transportation bureau. He was later transferred to the president's office, then to the claim department, and in the fall of 1910 was appointed chief clerk of Division 6, with headquarters at Sullivan Square Terminal, Charlestown. Shortly afterward Mr. Brush became chief clerk of Division 8, which comprises the entire business section of Boston and includes all surface car subways and tunnels. Mr. Brush is a brother of Mr. Matthew C. Brush, second vice-president of the Boston Elevated Railway. He is a member of the New England Street Railway Club. On the afternoon of Dec. 4 he was presented with a chest of silver at the main offices of the company in Boston on behalf of starters, inspectors, office and other employees. A farewell dinner was held in his honor on the same evening at the Engineers' Club, Boston, at which many officers of the company were present. In his new position, which he assumed this week, Mr. Brush will have charge of the operation of 107 miles of track in Portland and vicinity.

G. SABIN BRUSH

Mr. Oscar S. Straus, New York, ex-Ambassador from this country to Turkey and Progressive candidate for Governor in 1912, was named by Governor Whitman on Dec. 9 as member and chairman of the Public Service Commission for the First District, to succeed Mr. Edward E. McCall, who was removed from office on Dec. 6. The Governor said that Mr. Straus had accepted the position, and expected to qualify soon. Mr. Straus was born in Bavaria on Dec. 23, 1850. He lived in Talbotton, Ga., and afterward went to Columbus Ga., where he resided until 1865, when he moved to New York. He was graduated from Columbia University with the degree of A.B. in 1871. In 1873 he received the degree of LL.B. and in 1874 was granted an A.M. degree. He practised law in New York from 1873 to 1881. He was a member of the firm of L. Straus & Sons, importers of pottery and glassware, in New York from 1881 to 1906. He was Envoy Extraordinary and Minister Plenipotentiary to Turkey from 1887 to 1889 and again from 1898 to 1901. He was appointed a member of the Permanent Court of Arbitration at the Hague in 1902 to fill the vacancy caused by the death of former President Harrison. Ex-President Roosevelt appointed Mr. Straus Secretary of the Department of Commerce and Labor, and he served in that capacity from Dec. 17, 1906, to March 4, 1909. For the third time he was appointed Envoy Extraordinary and Minister Plenipotentiary to Turkey and served from May, 1909, to December, 1910. He was formerly president of the New York Board of Trade and Transportation; also of the National Primary League and of the American Social Science Association. He was vice-president of the National Civic Federation and the International Law Association. In 1914 he was appointed chairman of the arbitration commission selected to decide the wage dispute between the Eastern railways and their engineers. In 1912 he was the Progressive candidate against Mr. Sulzer for Governor of New York. The appointment of Mr. Straus as chairman of the commission was announced after the first editorial page of this issue had gone to press. This paper considers the appointment of Mr. Straus a good one and extends its congratulations to Governor Whitman on his selection.

OBITUARY

William H. Bache, retired manager of the Graphite Lubricating Company, Bound Brook, N. J., died on Nov. 12.

James Carrigan, who completed fifty years of continuous service with the Union Railway, New York, N. Y., died on Dec. 1. At the time of his death Mr. Carrigan was actively associated with the Union Railway as general superintendent. Mr. Carrigan, who was seventy-six years of age, began his railroad career with the old Huckleberry line in The Bronx in 1864, driving a street car between Harlem Bridge and Morrisania.

John H. Studley, for thirty-seven years identified with street railway service in eastern Massachusetts, died at Malden, Mass., on Dec. 5. Mr. Studley was born in Charlestown, Mass., sixty-three years ago. He was formerly treasurer of the old Middlesex Street Railway and of the Boston & Chelsea Street Railway. For many years he was employed by the Boston Elevated Railway in connection with transfer work. He is survived by his widow and a married daughter.

George W. Bruce, for twenty-three years claim agent of the street railway lines in Indianapolis, Ind., died at his home in that city on Nov. 28. He was seventy years old. Mr. Bruce was born in Dearborn County, Ind., on Sept. 8, 1845. He was educated at Moores Hill College, and, after he was graduated, taught school for about two years. He then went to Cincinnati and became connected with the Adams Express Company. Later he was appointed agent for this company at Indianapolis. After nearly fifteen years' service with the Adams Express Company, Mr. Bruce was chosen bailiff in the Superior Court at Indianapolis and held that office for about twelve years. In 1892 he was appointed claim agent for the Citizens' Street Railroad, which then operated the street railway lines in Indianapolis, and he continued as claim agent for the Indianapolis Traction & Terminal Company when that company leased the street railway properties. Mr. Bruce is survived by his widow, two sons, a sister and two brothers, one of whom, Joseph G. Bruce, is connected with the claim department of the Indianapolis Traction & Terminal Company.

Andrew Freedman, financier, director of many corporations and a silent power in Democratic politics in New York, died on Dec. 4. Mr. Freedman was born in New York City on Sept. 1, 1860. He attended the public schools and later the College of the City of New York, from which institution he was graduated. His first business connection was with a wholesale dry goods house. In 1885 he entered the real estate business and became a specialist in this field. In 1898 Mr. Freedman became interested in the Fidelty & Guarantee Company, Baltimore. He left that company in 1903 to organize the Casualty Company of America. The formation of the Interborough Rapid Transit Subway Construction Company was largely due to his efforts. It is said that it was to him that Mr. John B. McDonald came with the idea of the New York subway, and together they interested Mr. August Belmont in the project. As the owner of the New York Baseball Club Mr. Freedman came into national prominence in the world of sports. In 1902 he sold his interest in the Giants to the late John T. Brush. Mr. Freedman was a director of many companies, among them the Interborough Rapid Transit Subway Construction Company, the New York Transportation Company, the Fifth Avenue Coach Company, the New York Consolidated Company, the New York & Queens County Railway and the New York Railways. Mr. Freedman was also a trustee of the New York & Long Island Railroad. He was unmarried.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

*Consolidated Utilities Company, Wilmington, Del.—Incorporated in Delaware to lease, own and operate electric railways. Capital stock, $3,300,000. Incorporators: Herbert E. Latter, Norman P. Coffin and Clement M. Egner, all of Wilmington.

*Youngstown & Niles Railway, Youngstown, Ohio.—Incorporated in Ohio with a capital stock of $10,000. R. P. Stevens, president of the Mahoning & Shenango Railway & Light Company, has stated that the new line will extend from the Mahoning Avenue line to Niles, along the south side of the Mahoning River. Incorporators: James P. Wilson, U. C. DeFord, Fred J. Heim, Richard Wilson and J. W. Blackburn.

*Green Bay & Eastern Railway, Green Bay, Wis.—Incorporated in Wisconsin to construct a line from Green Bay to Sheboygan via Manitowoc, 70 miles. Capital stock, $50,000. Among the incorporators are Charles Frazier and Rude Stockinger, Manitowoc, and R. P. Mattern, Milwaukee.

FRANCHISES

*Los Angeles, Cal.—Henry. M. Dennison has received from the Council a one-year extension of time on a franchise to construct a line on Main Street between Slauson and Manchester Avenues.

Sacramento, Cal.—The Oakland, Antioch & Eastern Railway has received a franchise from the Council to construct a double-track line on M Street, extending westerly to the Sacramento River, thence easterly along M Street to Third Street, along Third Street to I Street, the portion of the line to be constructed on the M Street bridge to be single track.

St. Louis, Mo.—The East St. Louis & Suburban Railway has asked the Board of Public Service for a franchise to operate cars over the free bridge and around a loop which they propose to build in St. Louis.

Niles, Ohio.—The Cleveland, Alliance & Mahoning Valley Railroad has asked the Council for a franchise to extend its tracks through Niles.

Youngstown, Ohio.—The Youngstown & Southern Railway has asked the Council for a ten-year extension of time on its franchise, making the concession good for twenty-five years from the date of its passage.

Barrie, Ont.—The Toronto, Barrie & Orillia Railway has asked the Council for a one-year extension of time on its franchise to construct a line in Barrie.

TRACK AND ROADWAY

Little Rock Railway & Electric Company, Little Rock, Ark.—As a counter proposal to the city, this company offers the extension of several lines at a cost of $310,683 if the city will abandon the use of its electric light plant, purchase power from the company, regulate jitneys and make other concessions.

Central of Florida Railway, Daytona, Fla.—This company plans to build about 2 miles of single track during 1916.

*Ocala, Fla.—Citizens of Ocala are interested in a proposition to construct an electric line between Ocala and Silver Springs. A committee comprising Jake Brown, J. H. Taylor and J. M. Thomas was elected to confer with the Council with a view to calling a bond election to raise funds sufficient to construct the line.

Lula-Homer Railroad, Lula, Ga.—A report from this company states that it expects to build 110 miles of new line during 1916, as follows: From Winder to Jefferson, 15 miles; from Jefferson to Commerce, 14 miles; from Commerce to Cinesville, 18 miles; from Cinesville to Bowerswell, 14 miles; from Hartwell to Anderson, 23 miles; from Belton to Homer, 14 miles; from Homer to Cinesville, 21 miles. The contract for the construction of one section from Belton to Homer has been awarded to W. J. Redmond, Atlanta. D. G. Zeigler, engineer. [Sept. 25, '15.]

*Pocatello Transportation & Interurban Company, Pocatello, Idaho.—Prominent business men and capitalists of Pocatello are interested in a proposed line to be built by this company. It is expected that articles of incorporation will be filed at once. The company has opened offices in the Kane Building and preliminary arrangements are being made for the organization of the company.

Alton, Granite & St. Louis Traction Company, Alton, Ill.—The city of Alton has asked this company to extend its line 1 mile east of Alton to the State Hospital site.

Gary, Hobart & Eastern Traction Company, Hobart, Ind.—This company reports that during 1916 it plans to build about 12 miles of track between Hobart and Valparaiso.

Fort Dodge, Des Moines & Southern Railroad, Boone, Iowa.—This company reports that during 1916 it expects to build about 6 miles of new line from Swanwood Junction to Des Moines, over which section the company is now using leased tracks.

Charles City Western Railway, Charles City, Iowa.—This company has completed the construction of an extension of its line from Charles City to Colwell, 8 miles.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—Operation on this company's line has been extended to Linwood, half-way between Bonner Springs and Lawrence. It is expected that operation to Lawrence will be begun within a few weeks.

Cumberland & Manchester Railroad, Barbourville, Ky.—The contract for the construction and track-laying of this company's line from Barbourville to Manchester has been awarded to the Read Construction Company, Philadelphia and Hazleton. [Nov. 27, '15.]

Springfield (Mass.) Street Railway.—Announcement has been made by this company that operation on the new East Street line into Chicopee Falls will be begun within the next few days.

Detroit (Mich.) United Railway.—This company will extend its South Dearborn line from River Rouge to Ecorse and operation will be begun about Dec. 25. The extension will carry the company's city lines 3 miles southwest of the Detroit limits.

Kansas City, Lawrence & Topeka Electric Railroad, Kansas City, Mo.—A report received from this company states that it expects to build 52 miles of single track between Zarah and Topeka during 1916.

Moncton Tramways, Electricity & Gas Company, Ltd., Moncton, N. B.—This company reports that during 1916 it expects to construct about 1½ miles of track in the city and suburbs of Moncton and to Sunny Brae.

Public Service Railway, Newark, N. J.—Operation has been begun by this company on its extension from Roosevelt Junction, on the Trenton fast line, to Carteret and Chrome, 1½ miles.

International Railway, Buffalo, N. Y.—This company has submitted plans to the Ontario Railway Board of alternative changes in the line from Queenstown Heights to the level of Lake Ontario, on which a serious accident occurred last summer. Recently the Ontario Railway Board submitted plans proposing a new down-grade, single-track line which would take one long, continuous curve, leaving the present line for up-grade traffic. The alternative proposed by the company's engineering experts is a reconstruction of the present double-track line to lengthen the curves and ease the grade. It is expected this plan will be acceptable to the board.

Jamestown & Buffalo Street Railway, Buffalo, N. Y.—Clarence G. Mead, who is securing the right-of-way for the proposed electric railway from Jamestown to Buffalo, is now working in the vicinity of Eden. The rights-of-way from Jamestown are mostly secured. As proposed, the line from Gowanda will extend east of the Erie until near Lawtons, when it will change to the west and from Hamburg will extend to Athol Springs, connecting there with the tracks of the Buffalo & Lake Erie Traction Company. [Jan. 10, '14.]

Interborough Rapid Transit Company, New York, N. Y.—The contract for the installation of tracks on the White Plains extension of the Lenox Avenue branch of the existing subway has been awarded by the Public Service Commission for the First District of New York to the Coast & Lake Contracting Corporation, the lowest bidder, at $53,930.50. Bids were opened Dec. 7 for construction of the tunnel under the East River from Fourteenth Street, Manhattan, to North Seventh Street, Brooklyn. The two lowest bidders were Booth & Flinn, Ltd., $6,631,000, and Holbrook, Cabot & Rollins Corporation, $6,907,000.

Long Island Railroad, New York, N. Y.—All tracks of the Long Island Railroad are now in use over the new $1,000,000 Woodside-Winfield cut-off, which eliminated a dangerous curve and ten grade-crossings, including the one at Queens Boulevard, where thousands of automobolists have been compelled to use a steep wooden bridge. This will be removed in a few weeks, permitting the double-tracking of Manhattan & Queens Traction Corporation, and the old tracks of the Long Island Railroad will be removed and the land sold for building sites.

Manhattan & Queens Traction Corporation, New York, N. Y.—Efforts of the property owners in the southern section of Jamaica, Queens, to compel the Manhattan & Queens Traction Corporation to extend its lines from the Jamaica station to the city line, at Rosedale, have been defeated by the Board of Estimate. A resolution has been adopted directing that the line be constructed as soon as possible to the junctions of Sutphen Road and Lambertville Avenue and that the construction to St. Albans be completed only upon an order from the borough president of Queens with the sanction of the Board of Estimate.

Rochester (N. Y.) Connecting Railway.—The Public Service Commission at Albany on Dec. 1 heard further testimony in behalf of the application of the Rochester Connecting Railway for a certificate of public convenience and necessity. The new road, which is designed to afford a connection at Rochester with the Erie and the Pennsylvania Railroads for the Buffalo, Lockport & Rochester Railway, together with the other projects designed to connect the Buffalo, Lockport & Rochester Railway with the Canadian Northern and other roads at its western terminus, is being opposed by the New York Central. Testimony was not concluded when the hearing was adjourned to a future date.

***Champlain & Sanford Railroad, Sanford, N. Y.**—It is reported that this company has secured right-of-way for the construction of a line from Sanford Lake to Fort Ticonderoga, about 60 miles.

Dover, Millersburg & Western Railway, Canal Dover, Ohio.—Bids are being received by this company for the construction of its proposed line between Canal Dover and Millersburg via Sugar Creek. The line will cross the Wheeling & Lake Erie Railroad at grade and the Baltimore & Ohio and Pennsylvania Railroads on an overhead line. Benjamin George, Canal Dover, is interested. [Nov. 13, '15.]

Cleveland, Alliance & Mahoning Valley Railroad, Cleveland, Ohio.—It is reported that this company is considering plans to build a double-track extension from Warren to Youngstown, via Niles. Local real estate dealers are said to be much interested in the new project and are assisting in securing the needed right-of-way.

East Liverpool Traction & Light Company, East Liverpool, Ohio.—According to a statement made by C. A. Smith, general manager of the East Liverpool Traction & Light Company, at a recent meeting of the Council, about $250,000 will be expended within the next few months in improving the lines and property of the company. Of this amount between $75,000 and $100,000 will be required in the construction of the new "safe route" to Grandview, while approximately $20,000 will be necessary for the improvements in the West End. The improvements of the property of the company on Harvey Avenue would also involve an expenditure of several thousand dollars.

Hershey (Pa.) Transit Coompany.—Operation has been begun by this company on its extension from Hershey to Elizabethtown.

Montreal & Southern Counties Railway, Montreal, Que.—This company's extension from St. Cesaire to Abbotsford and Granby has been completed and W. B. Powell, general manager, has announced that the line will be placed in operation from Montreal to Granby during the early part of this month.

Chattanooga (Tenn.) Traction Company.—Grading has been begun by this company on its extension to Hixon. Rights-of-way have been acquired for practically the entire distance. It is stated that the grading will be completed within ninety days when the work of laying track will be begun. An order was placed some time ago for the rails and it is expected that they will be delivered by the first of the year.

Richmond, Rappahannock & Northern Railway, Richmond, Va.—The contract for the construction of this company's line from West Point to Urbanna, 17 miles, has been awarded the Central Construction Company, Harrisburg, Pa. C. L. Ruffin, 514 American National Bank Building, Richmond, chief engineer. [Nov. 20, '15.]

Princeton & Bluefield Electric Railway, Princeton, W. Va.—It is reported that construction on this company's line between Princeton and Bluefield is nearing completion and it is expected that operation will be begun by Jan. 1. The Princeton Power Company, of which S. J. Evans is president, is building the road.

Sheboygan Railway & Electric Company, Sheboygan, Wis.—During 1916 this company expects to build 1 mile of track in Sheboygan.

SHOPS AND BUILDINGS

Holyoke (Mass.) Street Railway.—This company has provided material for two waiting stations, which the people of South Amherst will set up at the junction of West Street, Bay Road and Potwin Lane.

Northern Texas Traction Company, Ft. Worth, Tex.—The Board of City Commissioners of Dallas has been notified by Edward T. Moore, representing the Northern Texas Traction Company, of the acceptance of the ordinance granting a franchise for the erection of a union interurban passenger station which is to cost approximately $2,000,000. Work will be started on the structure by Dec. 20.

Petersburg & Appomattox Railway, Petersburg, Va.—Plans are being made by this company to build a carhouse and power house at Plant Street and Tenth Avenue, Hopewell.

POWER HOUSES AND SUBSTATIONS

Richmond Light & Railroad Company, New York, N. Y.—This company has petitioned the Public Service Commission for permission to make improvements and additions to its electric plant.

Dover, Millersburg & Western Railway, Canal Dover, Ohio.—This company, which plans to build a line between Canal Dover and Millersburg, via Sugar Creek, will build a power house at or near Sugar Creek.

Lake Shore Electric Railway, Cleveland, Ohio.—This company will build an extension to its power house at Fremont. Contract has been awarded.

Toronto (Ont.) Suburban Railway.—The new substation of the Toronto Suburban Railway in Lambton Park is now nearly completed. A large water tower has been erected at the east side of the building.

Quebec Railway, Light & Power Company, Quebec, Que.—This company is building an extension to its power house at Montmorency Falls and it is expected that construction will be completed about Dec. 15. It will add 15,000 hp. to the power at present at the company's disposal.

Texas Traction Company, Dallas, Tex.—The substation of this company, 1½ miles south of Sherman, was destroyed by fire on Nov. 29, entailing a loss of $35,000. Three transformers and three modern rotary converters were lost. The fire was caused by the high-tension wire carrying 33,000 volts breaking and falling across the dispatcher's telephone wire. A portable substation was rushed out from Denison, and the traffic was resumed within five hours.

Manufactures and Supplies

ROLLING STOCK

Ogden, Logan & Idaho Railway, Ogden, Utah, expects to purchase during 1916 three motor cars.

Southern Oregon Traction Company, Medford, Ore., expects to purchase during 1916 one four-motor car.

Reading Transit & Light Company, Reading Pa., has completed the remodeling of one of its double-truck cars in its shops.

Lehigh Valley Transit Company, Allentown, Pa., expects to issue specifications in about a week for eighteen new center-entrance interurban cars.

Northern Ohio Traction & Light Company, Akron, Ohio, expects to purchase during 1916 ten 53-ft. interurban cars and fifteen 50-ft. city cars, both types semi-steel.

Covington & Oxford Street Railway, Covington, Ga., expects to purchase next year two light single-truck trailers 18 to 20 ft., and second-hand for temporary service.

United Railways & Electric Company, Baltimore, Md., it is reported, will equip with vestibules and improved steps 560 of its cars. New wheelguards and improved fenders will also be provided. The work is to start next spring.

Pittsburgh (Pa.) Railways, noted in the ELECTRIC RAILWAY JOURNAL of Nov. 27, 1915, as having ordered 175 city cars, has an option of increasing the St. Louis Car Company order from 100 to 150 cars and the Cincinnati Car Company order from seventy-five to 100 cars.

Interborough Rapid Transit Company, New York, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of Nov. 27 as having ordered 311 subway car bodies from the Pullman Company, has ordered the trucks also from this company. The order for electric equipment will be equally divided between the General Electric Company and the Westinghouse Electric & Manufacturing Company.

Wilmington & Philadelphia Traction Company, Wilmington, Del., noted in the ELECTRIC RAILWAY JOURNAL of Nov. 6 as having ordered thirty-one prepayment semi-convertible cars from The J. G. Brill Company, has specified the following details for this equipment:

Seating capacity 44	Curtain fixtures, Cur. Sup. Co., No. 89
Weight of car-body, 15,000 lb.	Curtain material...Fabrikoid
Bolster centers, length, 17 ft. 4 in.	Destination signs, Elec. Ser. Sup. Co.
Length of body.....29 ft.	Fenders .....Parmenter
Length over vestibule..40 ft.	Gears and pinions.....G.E.
Width over sills...8 ft. 2 in.	Gongs .....Brill
Height, rail to sills..26½ in.	Hand brakes, National Brake Co.
Height, sill to trolley base, 9 ft. 1¾ in.	Heaters.Peter Smith Electric
Body construction, T-iron posts, sheet steel sheathing, wood roof	Headlights .....Esterline
Interior trim, cherry, stained mahogany	Motors.....G.E., 258-A, 4 per car, inside hung
Head-lining .....Agasote	Paint...Chicago Varnish Co.
Roof .....plain arch	Registers..International R-7
Underframe .....metal	Sanders.....Brill "Dumpit"
Air brakes .....G.E.	Sash fixtures .....Brill
Bumpers.Hedley anti-climber	Seats, Brill "Winner," pressed steel
Cables .....G.E.	Seating material.....cane
Car trimmings.....Brill	Trolley catchers, Elec. Ser. Sup. Co.
Conduits and junction boxes, Brill	Trolley base.....G.E.
Control .....G.E.	Trucks.....Baldwin 62-18c
Drawbar .....portable	Varnish.Chicago Varnish Co.
	Ventilators.....Ry. Utility

TRADE NOTES

Elyria Iron & Steel Company, Cleveland, Ohio, announces the removal of its general offices from Elyria, Ohio, to 232 East 131st Street, Cleveland, Ohio, where the company just completed an additional plant.

Woodmansee & Davidson, Chicago, Ill., engineers, announce their removal, effective Dec. 15, from the First National Bank Building to Suite 782-788, Continental & Commercial National Bank Building.

H. L. Lewenberg has been appointed engineer of estimates of the St. Louis Car Company, after having been in its service for several years. Mr. Lewenberg was formerly with the Standard Steel Car Company and the Pressed Steel Car Company, and is a graduate of the Massachusetts Institute of Technology.

Krehbiel Company, Chicago, Ill., engineers and constructors, announce the appointment of Edward N. Lake, formerly in charge of the Chicago office of the Stone & Webster Engineering Corporation, as a partner in this company with offices in the Marquette Building, Chicago. The business will be continued under the present firm name. Mr. Lake will be treasurer and manager and Fred A. Krehbiel will continue as president. Both were connected with the Arnold Company and Bion J. Arnold for a number of years. Mr. Lake has also been connected in turn with the Western Electric Company, Chicago-Edison Company and Board of Supervising Engineers.

The J. G. Brill Company, Philadelphia, Pa., on Dec. 1 instituted direct representation on the Pacific coast with offices at 907 Monadnock Building, San Francisco, this arrangement taking the place of the relationship formerly existing between The J. G. Brill Company and Pierson, Roeding & Company. The establishment of its own Pacific coast offices and representatives has been deferred for years by reason of the very satisfactory association with Pierson, Roeding & Company. However, the new course, because of its certain desirable features, was an inevitable eventuality. The present time seemed best for all parties concerned in the consummation of the change and therefore the sales organization of The Brill Company has been extended to the Coast.

Kelly, Cooke & Company, Philadelphia, Pa., have recently opened offices in the Drexel Building, to conduct a general engineering practice in the public utility and industrial fields. Their work includes design and supervision of construction for railways, light and power properties and industrial plants; engineering reports, appraisals, and rate developments for public utilities. William F. Kelly, senior member, received the degree of Mechanical Engineer from the University of Pennsylvania in 1893. For several years thereafter he was on the engineering staff of the Union Traction Company of Philadelphia and from 1901 to 1915 was a member of the staff of Ford, Bacon & Davis, acting as engineer-in-charge of several of their larger operations including the construction and reconstruction of the properties of the Knoxville Railway & Light Company and the Birmingham Railway, Light & Power Company. Charles B. Cooke, Jr., was also graduated from the University of Pennsylvania and entered the shops of the Westinghouse Machine Company at East Pittsburgh, working up finally to the position of assistant commercial engineer of the company, which position he occupied for two years prior to joining the staff of Ford, Bacon & Davis. During his connection with the latter firm Mr. Cooke specialized on financial engineering reports and also had personal charge of a number of important rate developments and reports for public utility companies.

ADVERTISING LITERATURE

St. Louis (Mo.) Car Company has issued a folder describing the new light-weight car built for the Albuquerque (N. M.) Traction Company, seven of which are now in service.

Railways Accessories Company, Seattle, Wash., has issued a bulletin describing the supported and suspended types of the Wightman rail joint and base plate. These joints are claimed to be in no way dependent on bolt pressure, thus eliminating track-way expense pertaining to bolt renewals and tightening. It is also stated that these joints minimize the breaking strain on angle bars, minimize vibration at rail ends, eliminate tie pounding and prevent the settling of ties, known as "low joints." It is also said that they eliminate all relative motion of rail ends, either vertical or lateral, prevent rail breakage resulting from the accumulation of longitudinal strains and maintain positive and permanent contact between angle bars and rails, thus rendering electrical bondings unnecessary in block signal circuits.

BRILL SINGLE-TRUCK CARS

There is surely something wrong about the system of running half-loaded big cars most of the time—cars that most of the day are eating up the revenue of the short, rush-hour periods. It's like the man who has a big, heavy touring car to run around town alone in all day so that he may have room to take all the family out on Sunday. Of course, it doesn't apply everywhere, but there are many places in this fair land where the public is being served with too many seats and not enough cars. And, like the man with the auto, who finally added a little runabout and saved money, so many a road could put light-weight, single-truck cars in service and make money.

THE J. G. BRILL COMPANY, PHILADELPHIA, PA.
AMERICAN CAR COMPANY, ST. LOUIS, MISSOURI
G. C. KUHLMAN CAR COMPANY, CLEVELAND, OHIO
WASON MANUFACTURING CO., SPRINGFIELD, MASS.
COMPAGNIE J. G. BRILL, PARIS, FRANCE

General Electric Company

Manufacturers of Steam Turbines Ranging in Capacity from 1 to 50,000 K.W.

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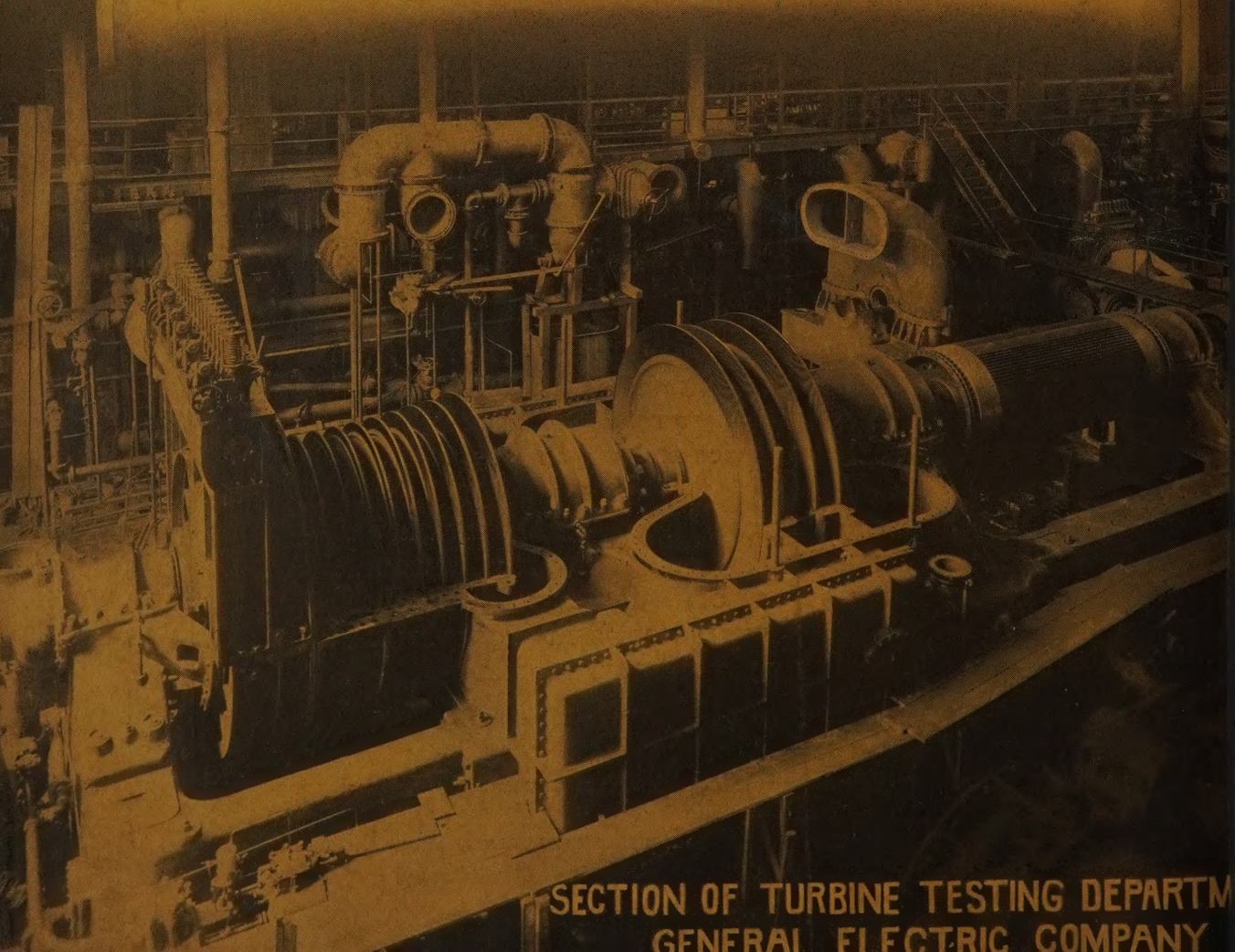
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